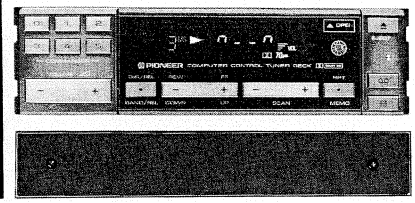
PIONEER

Service Manual



ORDER NO.
CRT-471-0

CENTRATE CAR AUDIO SYSTEM

FEX-55

US, CA, CS

- **Cassette Mechanism Assembly**

See the Service Manual CX-156/A (CRT-468) when servicing the cassette mechanism assembly.

SPECIFICATIONS

General

Power source ..... DC 14.4V (10.8~15.6V allowable)
Grounding system ..... Negative type
Dimensions (Controller) ..... 180(W)×50(H)×168(D)mm
[7-1/8(W)×2(H)×6-5/8(D) in.]
(Tuner Unit) ..... 150(W)×25(H)×150(D)mm
[5-7/8(W)×1(H)×5-7/8(D) in.]
Weight (Controller) ..... 1.4kg (3.1 lbs.)
(Tuner Unit) ..... 0.6kg (1.3 lbs.)
Tone controls (bass) ..... ±10 dB (100Hz)
(treble) ..... ±10 dB (10kHz)
Maximum output level 200mV
Output impedance 2kΩ

Tape Player

Tape ..... Compact cassette tape (C-30~C-90)
Tape speed ..... 4.76cm/sec. (+0.14cm/sec., −0.05cm/sec.)
Fast forward/rewind time ..... Approx. 100 sec.for C-60
Wow & flutter ..... 0.09% (WRMS)
Frequency response ..... Metal: 30~20,000Hz (±3 dB)
Normal: 30~17,000Hz (±3 dB)
Stereo separation ..... 45 dB
Signal-to-noise ratio ..... Dolby NR IN: 63 dB (IHF-A network)
Dolby NR OUT: 55 dB (IHF-A network)

FM tuner

Frequency range ..... 87.9~107.9MHz
Usable sensitivity ..... 12 dBf (1.1μV/75Ω, mono)
50 dB quieting sensitivity ..... 17 dBf (1.9μV/75Ω, mono)
Signal-to-noise ratio ..... 70 dB (IHF-A network)
Distortion ..... 0.5% (at 65 dBf, 1kHz, stereo)
Frequency response ..... 30~15,000Hz (±3 dB)
Stereo separation ..... 40 dB (at 65 dBf, 1kHz)

AM tuner

Frequency range ..... 530~1,620kHz
Usable sensitivity ..... 18μV (25 dB) (S/N: 20 dB)
Selectivity ..... 70 dB (±10kHz)

These specifications were determined and are presented in accordance with specification standards established by the Ad Hoc Committee of Car Stereo Manufacturers.

Note:
Specifications and the design are subject to possible modification without notice due to improvements.

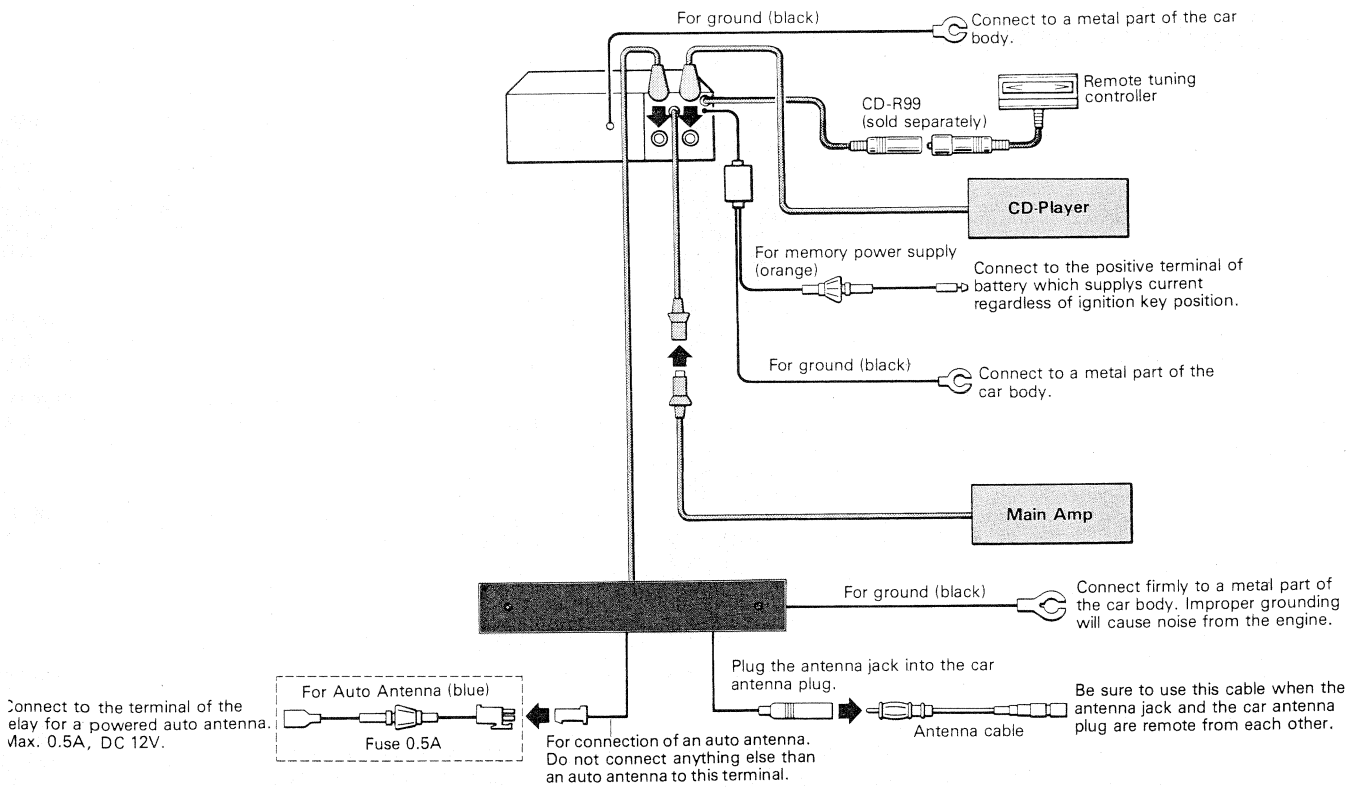
- Dolby and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.
- Noise Reduction System manufactured under license from Dolby Laboratories Licensing Corporation.

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS [USA] INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.
TEL: (800) 421-1404, (800) 237-0424
PIONEER ELECTRONIC [EUROPE] N.V. Keetberglaan 1, 2740 Beveren, Belgium TEL: 03/775·28·08
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia
TEL: (03) 580-9911

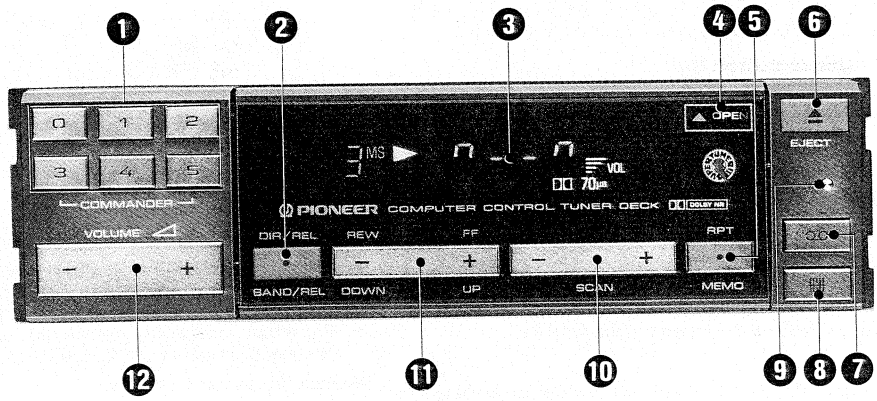
EX-55

CONTENTS

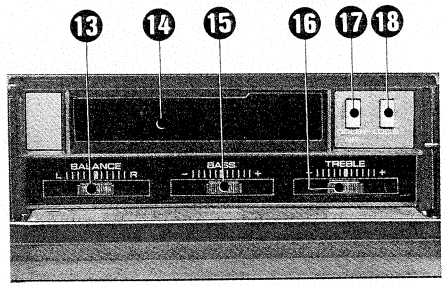
1. CONNECTION



2. OPERATION



(Front section)



(Flip-Down Control Panel Section)

Tape Operation

❶ Command Button

Press the command button to set the number of recorded selections to be skipped or to set the number of times a piece is to be repeated.

❷ Program Switching/Release Button

Press this button to switch from side A to side B and vice versa. Also, you can press this button to cancel music search, repeat, skip search, and fast forward or rewind.

❸ Display

❹ Open Indicator

Flip-down control panel opens when pressed.

❺ Music Repeat Button

Press this button to hear the piece you are listening to as many times as you wish. Also, with the repeat command set, the piece will play as many times as the number you have set. To cancel music repeat, press the release button or music repeat button one time.

❻ Eject Button

Use this button to eject the cassette from the unit.

❼ Tape Power Switch

Press to stop the play of a selection. Pressing again will supply power and cause the tape to continue from the position at which it stopped. When switching to the tuner, pressing the tuner power switch without turning the deck off will switch from the deck to the tuner.

❽ Clear Button

Press this button with a pointed rod if the tape running should by chance malfunction (incorrect display, etc.). After several seconds, tape running will return to normal.

❿ Fast Forward Button (+)/Rewind Button (−)

Press the (+) side for fast forward or the (−) side for rewind. For music search, press this button twice.

⓬ Volume Increase Button (+) Volume Decrease Button (−)

Press the (+) side to increase volume (soft → loud) or the (−) side to decrease volume (loud → soft). The button has 34 levels for adjustment. Each time you press the button, the volume level increases or decreases accordingly. Hold the button and the volume will increase or decrease continuously.

⓭ Balance Control

⓮ Cassette Insert Slot

Insert the cassette into the slot with the playing edge (the edge where the tape is exposed) to the right, and the deck will set the cassette automatically.

⓯ Bass Control

⓰ Treble Control

⓱ Dolby NR Button

Press this button to play a tape recorded on a Dolby NR system. (DD will light up on the display.)

- All the press type control buttons have an electronic sound (beep) and display for dual checking to confirm operation.
- Noise reduction manufactured under license from Dolby Laboratories Licensing Corporation. "Dolby" and the double-D symbol are trade marks of Dolby Laboratories Licensing Corporation.
- Since an oil damper is used for the flip-down control panel, temperature and/or installation angle may effect the time required for opening and closing.

Tuner Operation

❶ Station Preset Button

If you use this button to set FM/AM station frequencies in memory, you can preset and recall up to 12 FM (6 on FM1 and 6 on FM2) and 6 AM stations. Press the button to recall one of the 18 preset stations.

❷ Band Switching/Release Button

Press this button repeatedly to set bands in the following sequence: FM1 → FM2 → AM → FM1. Also you can release station scan by pressing this button.

❸ Display

❺ Memory Button

❽ Tuner Power Switch

Press this button to turn on power to the tuner control section. Press the button again to turn power off.
Also, when you want to listen to a tape, press the tape power switch directly and tape play will be selected instead of the tuner.

❾ Clear Button

If something goes wrong (display is incorrect, etc.) while you are listening, press this button with a pointed rod. After several seconds, operation will return to normal. Remember that when you press this button, all preset frequencies entered into memory are erased and programmed function settings are cleared so you should make settings again as desired.

❿ Scan Button

Press this button and the tuner will skip from station to station with a 5-second pause at each station. When you find the station you want to listen to, press the button again to set the tuner and release scan.

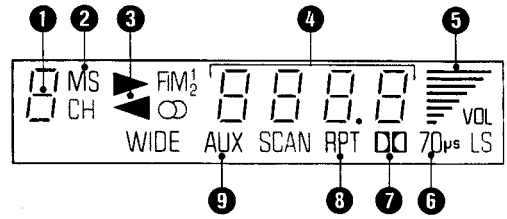
⓫ Tuning Button

Press the (+) side (low → high) or the (−) side (high → low) to adjust the station frequency setting.

⓲ Local Station Button

This button is used to change the search level of the scan tuner, and is usually kept in the "OFF" position under normal conditions. At night, when the reception of weaker frequencies improves, this button is pressed to avoid the scan tuning of such weaker frequencies. When this function is engaged, the LS indicator will be lit.

- All the press type control buttons have an electronic sound (beep) and display for dual checking to confirm operation.
- The tuner may not function properly when using it for the first time. In such a case, press the Clear button. The tuner will then return to normal operation after a few seconds.
- If a cassette tape is set while listening to either AM or FM broadcast, sound will automatically be switched from the tuner to the tape.



When Playing Tapes

❶ 8 : Number of Times to Skip or Repeat

The number corresponding to the commander button pressed to set the number of recorded sections to skip in skip search or the number of times to replay in music repeat is displayed.

- For music repeat, the number of repeats is set and the display changes as shown in the following figure.

Example: Set repeat for 2 times

Set → 2 → 1 → Clear → Return to normal tape play

❷ MS : Skip Search/Music Search Display

MS display lights when skip search or music search is operating.

- For skip search, the display changes as shown in the following figure.

Example: To find the beginning of the second selection before the one being played.

Set → 2 MS → 1 MS → 0 MS → Clear → Tape play

Example: To find the beginning of the second selection following the one being played.

Set → 2 MS → 1 MS → Clear → Tape play

- For music search, the display changes as shown in the follwoing figure.

Find the beginning of the presently playing piece.

Set → 0 MS → Clear → Tape play

Find the beginning of the next piece following the presently playing piece.

Set → 1 MS → Clear → Tape Play

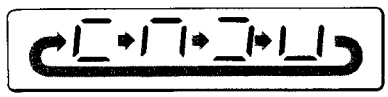
❸ ▶ ◀ : Tape Play Indication

When playing back upper tracks ▶ mark appears and when lower tracks are played back, ◀ mark appears.

❹-1 8888 : Tape Play, Fast Forward/Rewind Indication

When the ▶ mark appears, tape travel is in the normal direction and the ⌣ mark rolls in the direction shown in the following figure: (counterclockwise)

When the ◀ mark appears, tape travel is in the reverse direction and the ⊔ mark rolls in the direction shown in the following figure: (clockwise)



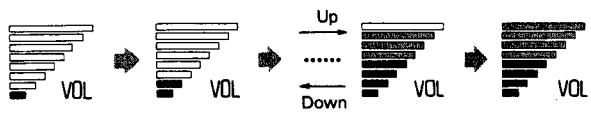
During fast forward and rewind, speed of rotation of the ⊔ mark is faster. During fast forward, the mark rolls in the normal direction. During rewind, the mark rolls in the reverse direction.

❹-2 8 8 8 : ATSC (Automatic Tape Slack Canceler) Display

When a cassette is set in the deck, the tape slack is taken up automatically. At this time □ _ _ □ display flashes.

❺ VOL : Volume Level

Press the volume button and the volume level is indicated in yellow steps from 1 to 19 and red steps from 20 to 34. Volume level change is indicated as shown in the following figure. The ▬ symbol is always lit.



❻ 70μs : 70μs Tape Display

Insert a cassette tape and the auto tape selector will automatically switch the equalizer (70μs/120μs). If it is a 70μs tape, the 70μs display will illuminate. If it is a 120μs tape, there is no display.

❼ DD : Dolby NR Display

Press Dolby NR button to listen to a tape recorded on Dolby NR. DD display will illuminate.

❽ RPT : Music Repeat Display

Press music repeat button and RPT display will illuminate to indicate the function.

❾ AUX : External Input Display

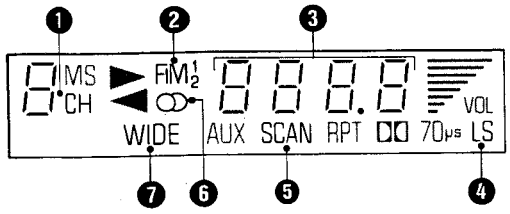
With this set turned OFF and another unit (Compact Disc Player, etc.), connected to the external input jack, is operating, the AUX display will illuminate.

1. Press the [▲ OPEN] ❹ indicator and the flip-down control panel will open.
2. Insert a cassette tape into the slot ⓮ and the deck will load the cassette automatically to play the tape.
3. Press Dolby NR button ⓱ to listen to your tapes recorded on Dolby NR system.
4. Adjust volume ⓬, balance ⓭, bass ⓯ and treble ⓰ controls as you like.
5. Close the flip-down control panel.
6. To stop a tape, press the tape power switch ❼. Press the switch again, and play will begin at the place where it was stopped.
7. To eject the cassette from the unit, first press the [▲ OPEN] ❹ indicator to open the flip-down control panel. Next press the eject button ❻ to eject the cassette.

Note:

- When the flip-down control panel is open, do not use excessive force to the panel so as not to damage it.
- If the cassette is not set properly, it will automatically eject approximately 4 seconds after insertion. If this should occur, ensure that the cassette is not damaged and insert it again.
- 4 seconds after pressing the eject button, the cassette does not eject but starts to play again. If the cassette still does not eject after three attempts, stop all equipment. If the condition should occur again, contact the dealer where you bought the deck or your nearest Pioneer Service Station for repairs.

When Listening to the Tuner



❶ 8 CH : Channel Number Display

Press the station preset button and the number of preset channel is displayed.

❷ FM : Band Display

Press the band switching release button repeatedly to set bands in the following sequence. FM1 → FM2 → AM → FM1. To listen to an FM station, set the button for FM1 or FM2. To listen to an AM station, set the button for AM.

❸ 8 8 8.8 : Frequency Display

Turn power on and the frequency band is displayed as 87.9 to 107.9 MHz for FM or 530 to 1,620 kHz for AM.

❹ LS : Local Station Display

Press local station button and LS display will illuminate to indicate the function.

❺ SCAN : Scan Display

Press scan button and SCAN display will illuminate to indicate the function.

❻ ⊙⊙: FM Stereo Reception Display

When FM stereo is being received, ⊙⊙ is illuminated.

❼ WIDE : Wide Display

While an AM signal is being received, the WIDE display will illuminate at the AM wide reception and it will go out at the AM narrow reception.

1. Press tuner power switch ❽ to turn power on. Band and frequency will illuminate on the display ❸.
2. Press band selection button ❷ to set the band you wish to listen to.
3. Select the station you want to listen to by using either manual or scan tuning. Press preset button ❶ to place in memory the frequency of a station you often listen to.
4. Set volume ⓬, balance ⓭, bass ⓮ and treble ⓯ controls to the position you like best.
5. Press tuner power switch ❽ to turn the power off.

Manual Tuning

To manually tune a station, press the tuning button ⓫ on the (+) side (low to high frequency) or (−) side (high to low frequency). Press the button once and the frequency will change 0.2 MHz for FM or 10 kHz for AM. Hold the button for more than 0.5 seconds and the frequency will change rapidly.

Scan tuning

Press the (+) side of the scan button ⓾ and the band is scanned upward. Press the (−) side of scan button to scan the band downward. When the scan operation is on, SCAN illuminates on the display. Frequency is changed automatically and scan stops at each station for 5 seconds. When you find the station you want to listen to, press release button ❷ and that station will play continuously.

Press the preset button to place a frequency in memory. This is convenient for finding a station you listen to often. Afterwards, the station can be recalled with a simple one-touch operation by pressing the preset button. Follow the steps below to use the preset station memory.

1. Press band selection button ❷ to set the band for FM1, FM2 or AM.
2. Receive the station that you wish to memorize using either manual or scan tuning.
3. Press memory button ❺ and CH will flash on the display ❸ for 5 seconds. During this time, press the preset button ❶ once. (for example, press button 2 and 2 CH will illuminate on the display.)
4. Now one button and one station frequency are in memory. Follow steps (2) and (3) for the other 5 buttons.

Note:

Both FM1 and FM2 cover the frequency band for 87.9 to 107.9 MHz. One preset button sets FM broadcast for two stations in memory, so a total of 12 stations can be set.

3. PARTS LOCATION

- *For your Parts Stock Control, the fast moving items are indicated with the marks ★ ★ and ★.*
  ★ ★: GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

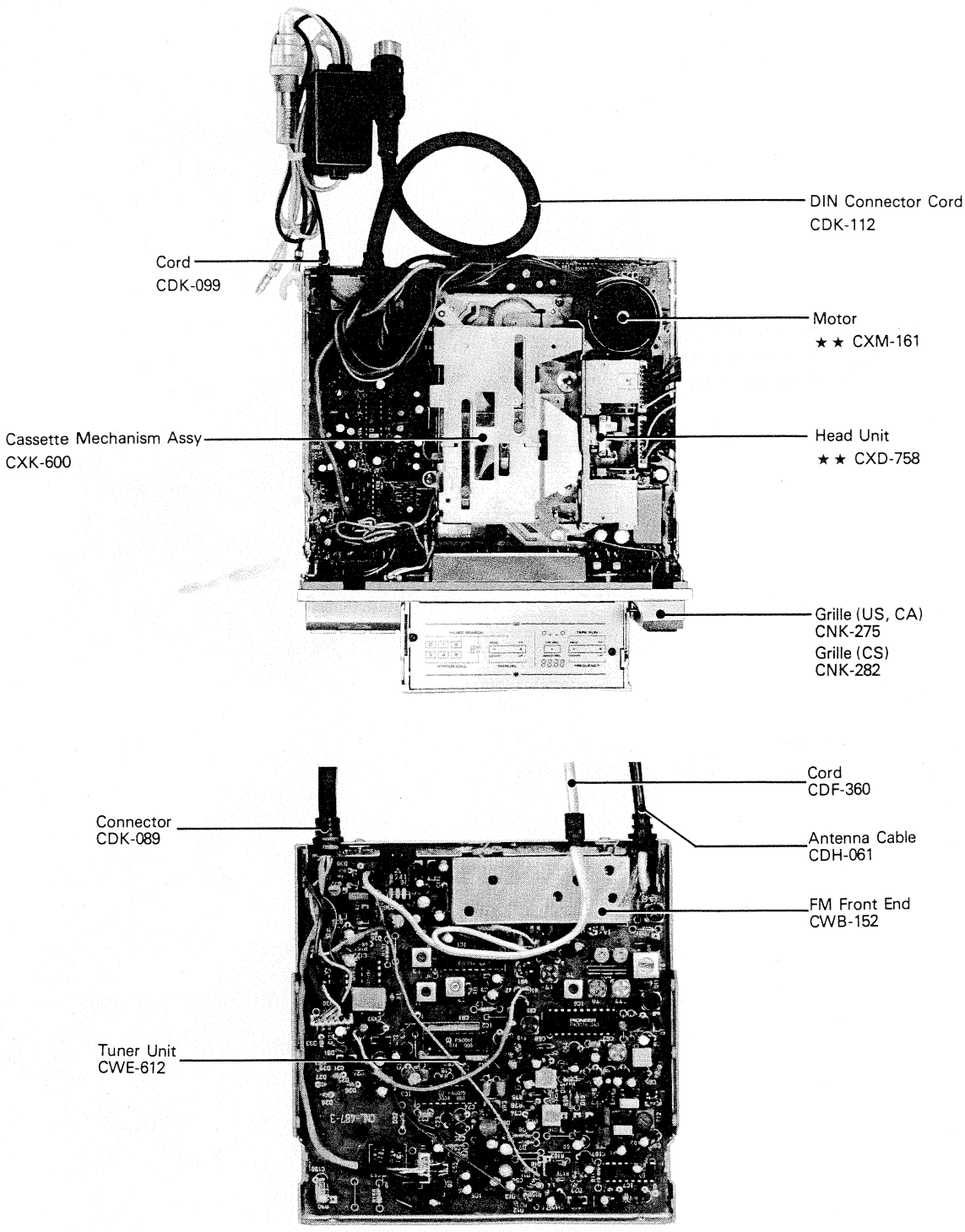


Fig. 1

4. DISASSEMBLY

• Case removal

1. The case can be removed by removing the four screws labeled "A".

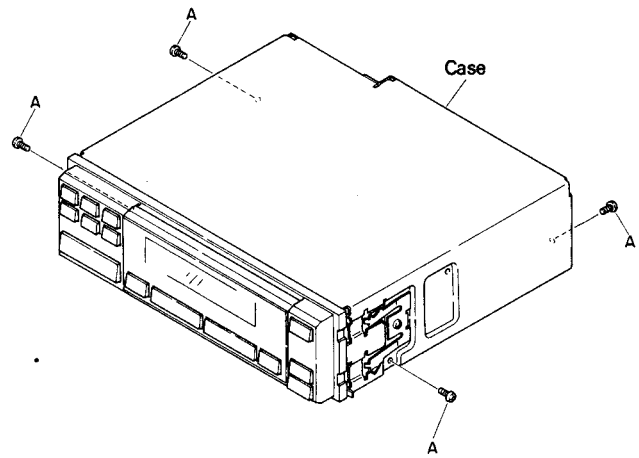


Fig. 2

• Cassette mechanism assembly removal

1. This assembly can be removed by removing the four screws labeled "B" and the connector.

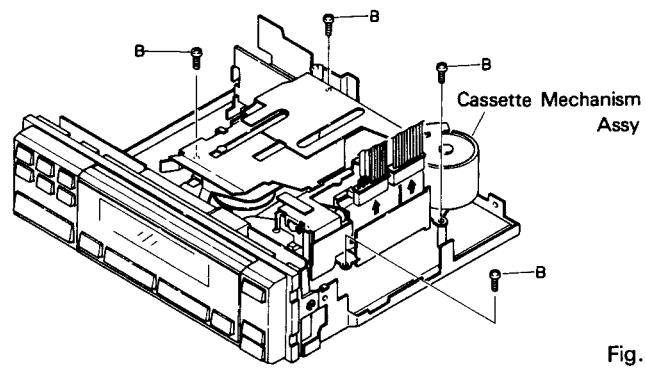


Fig. 3

• Chassis unit removal

1. This unit can be removed by removing the four screws labeled "C".

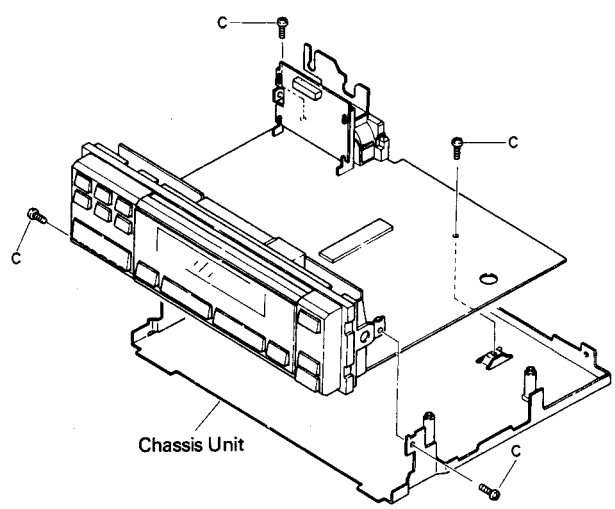


Fig. 4

• Grille assembly removal

1. This assembly can be removed by unsoldering points "A", "B", and "C" and then removing the two screws labeled "D".

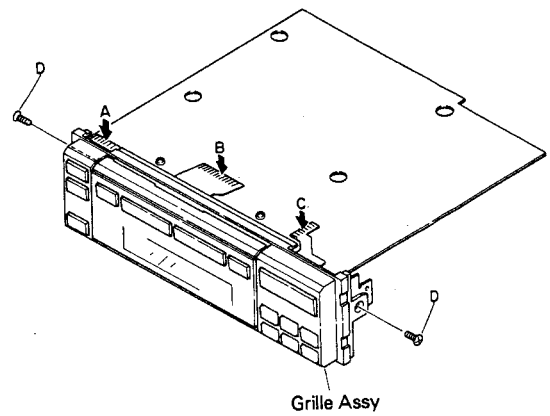


Fig. 5

• Switch unit (B) removal

1. This unit can be removed by removing the screw labeled "F".

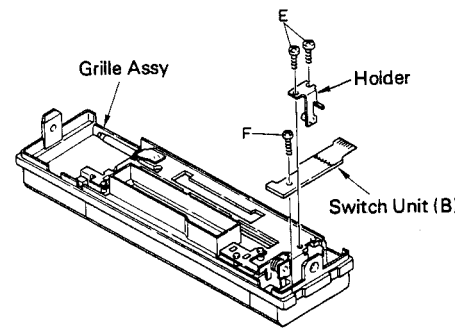


Fig. 6

• Display unit removal

1. Remove the two screws labeled "E" and take off the holder. The holder supports the display unit and allows it to turn, so it should be slid to the side and removed. (Fig. 6)
2. The display unit can be removed as shown in Fig. 7.

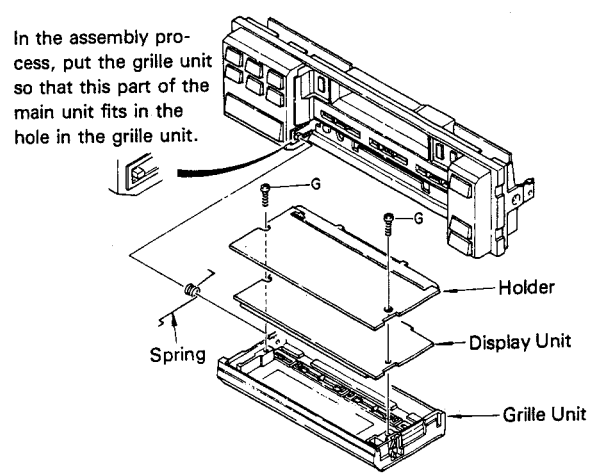
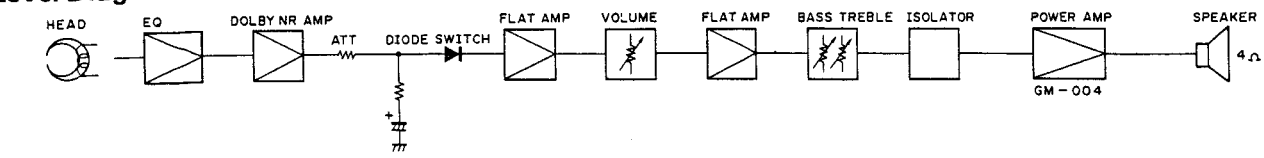


Fig. 7

5. CIRCUIT DESCRIPTION

• Level Diagram



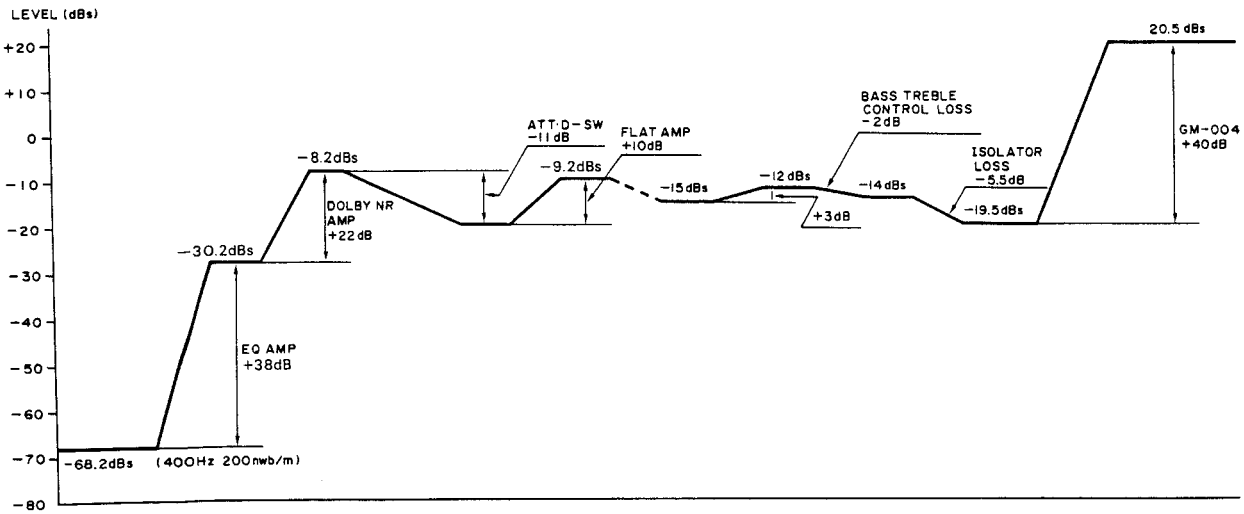


Fig. 8

• +B Diagram

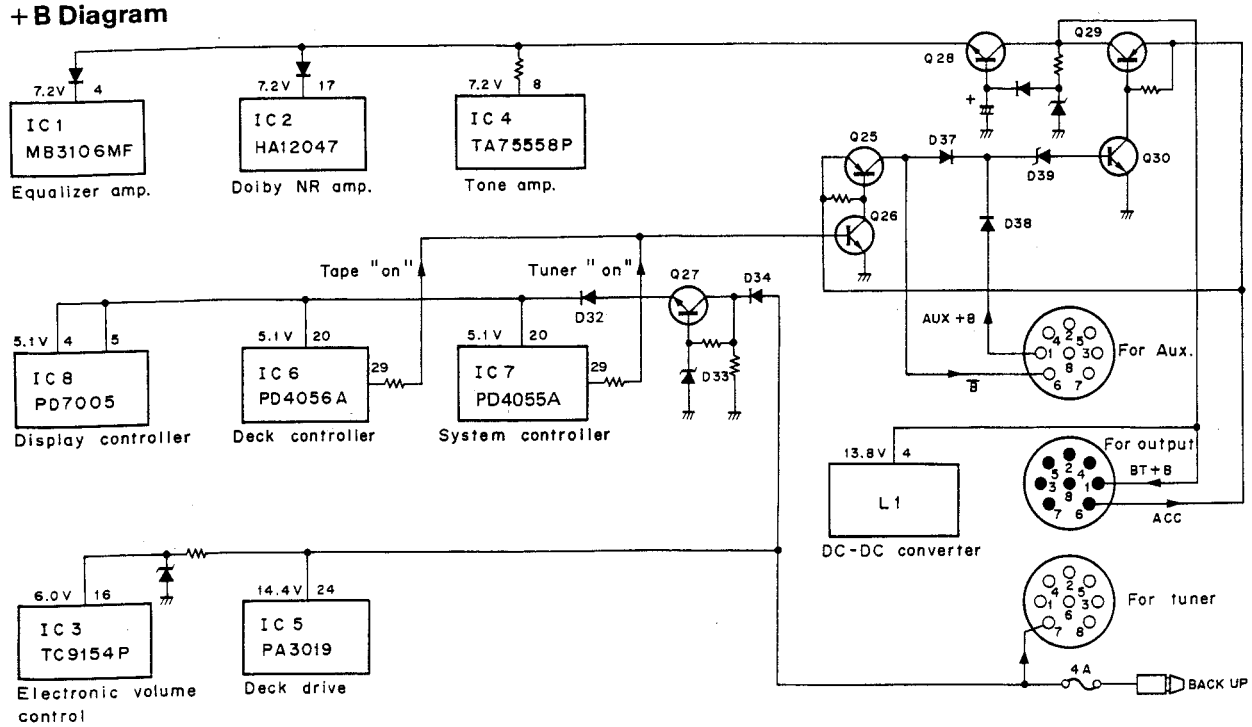


Fig. 9

• Block Diagram (Control Section)

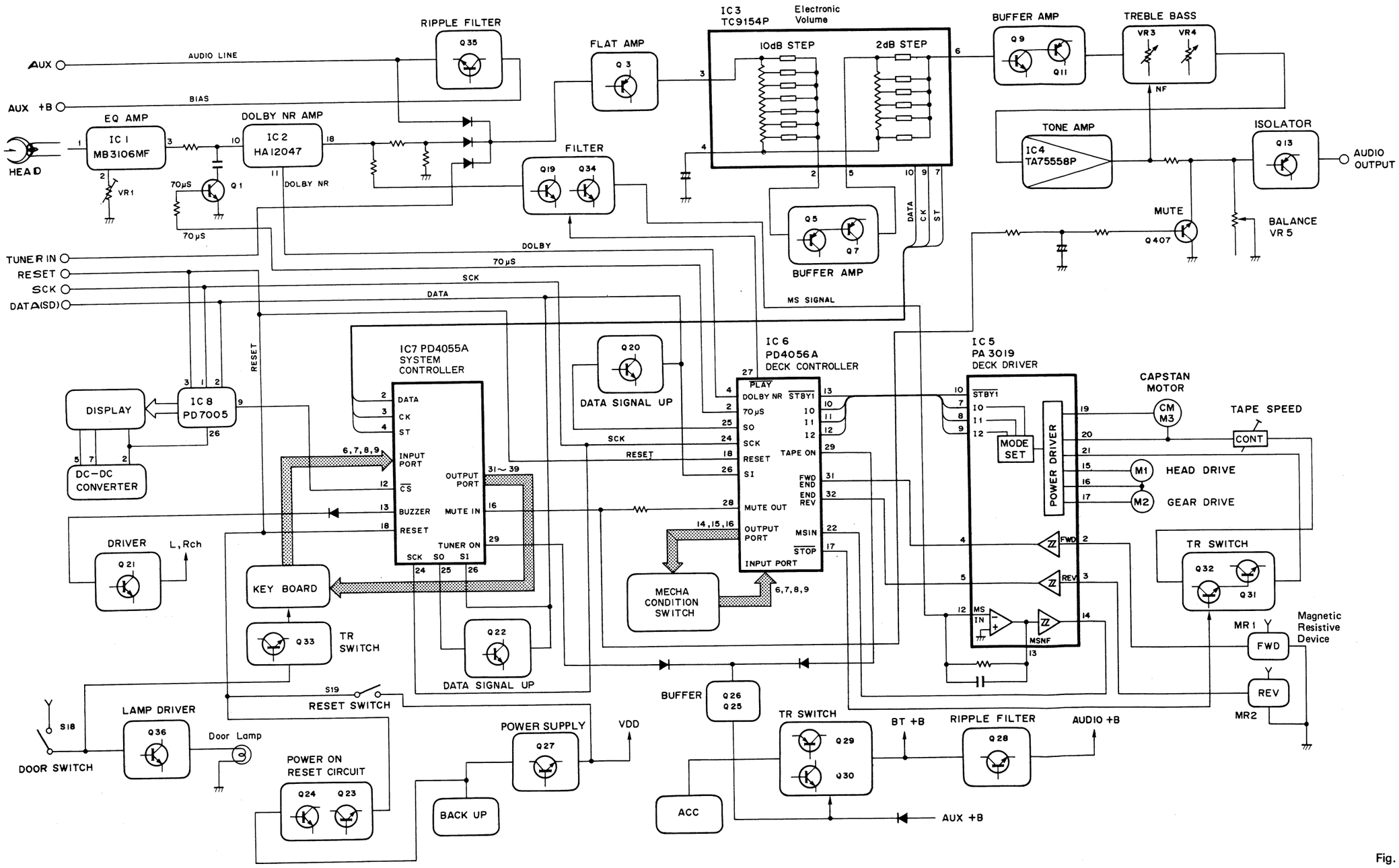


Fig. 10

5.1 CONTROL SECTION

• System Outline

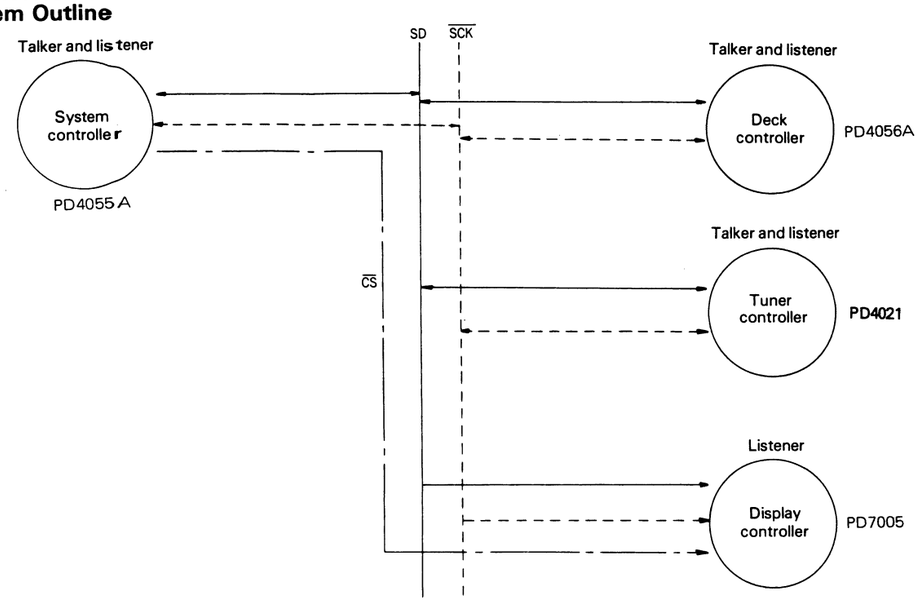


Fig. 11

In this unit, a system controller (PD4055A), a deck controller (PD 4056A), and a tuner controller are linked via eight bit serial data transmission. There are three signal lines. These are: a data line (SD), a serial clock line ($\overline{SCK}$), and a $\overline{CS}$ line between the system controller and the display controller.
The system, deck, and tuner controllers switch automatically between talker and listener in the sequence shown in Figure 12. The display controller is "listener only", and obtains 80 bits of serial data from the $\overline{CS}$ signal from the system controller.

Data is transmitted among the controllers by switching between talker and listener in the order shown in Figure 12 (system to deck to tuner to system). If two seconds pass after the command controller transmits a command, without a command being transmitted by either the deck or tuner controller, the system controller will transmit a "reset" command, followed by a "standby" command. The tuner and deck will then be switched "off."
When the deck and tuner controllers receive the "reset" command from the system controllers, they will enter the "listener" regardless of the above timing. They will receive the "standby" command from the system controller in this state.

T = Talker; L = Listener
Y = TYP. 6msec.

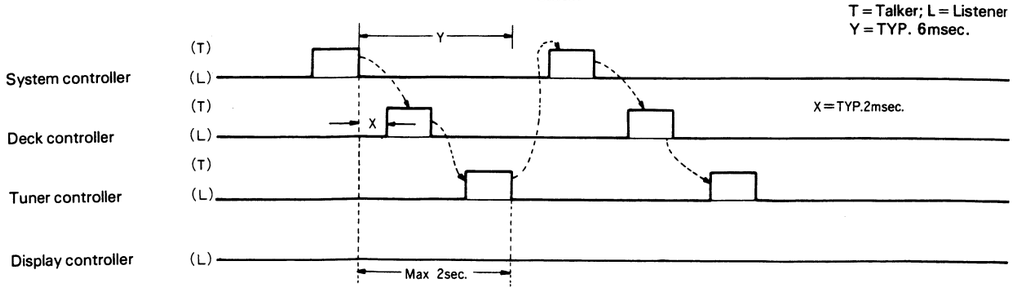


Fig. 12 Sequence of Switching between Talker and listener

When the tuner is not linked directly with the system, the system controller switches to "talker" after receiving data from the deck controller.
Display data may be transmitted from the system controller to the display controller indepedently. In such case, the system controller first transmits a display command in the "talker" mode. It then transmits a $\overline{CS}$ signal and 80 bits of display data to the display controller. The deck controller does not enter the "talker" mode immediately after receiving the display command. It enters the "talker" mode after 80 bits of display data have been transmitted. The tuner controller then enters the "command receipt from deck controller" mode.

When either the deck or tuner controller causes a change in the display, the controller causing the change transmits a command in the "talker" mode. It then transmits 80 bits of display data. The other controller, which is in the "listening" mode, ignores this transmission. The system controller inputs this transmission of display data. It then adds volume data, etc., as necessary, and switching temporarily to "talker", outputs 80 bits of display data to the display controller.

*The serial clocks operate at 100 kHz. When in the "talker" mode, the controller uses its own internal clock. When in the "listener" mode,, the controller uses the talker's clock.

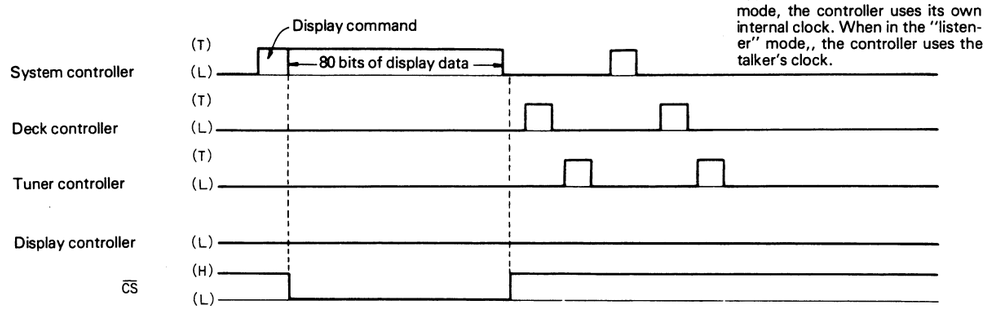


Fig. 13 Sequence of Transmission of Display Data by System Controller

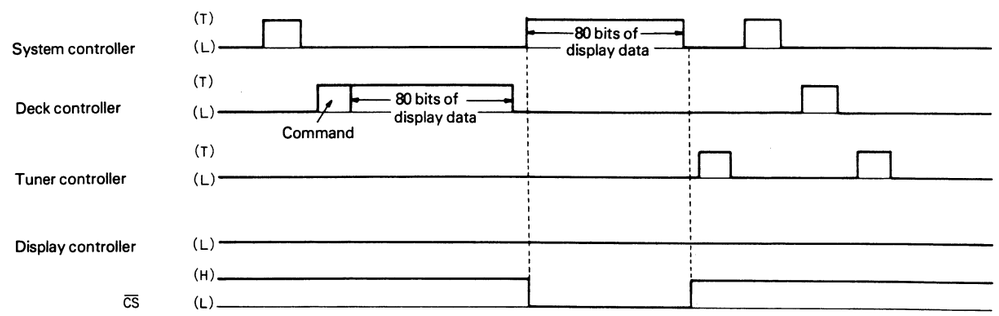


Fig. 14 Sequence of Transmission of Display Data from Deck Controller

• Standby Function

The system controller checks the position of the automobile Acc switch at least once every 6 microseconds (pin 14). If the system controller detects that the Acc switch is in the "off" position, it sends a display command after it switches to the "talker" mode. It then transmits an 80-bit "all 0" display data to the display controller, thus turning off the display. When it next switches to the "talker" mode, it transmits a "standby" command to the deck and tuner controllers, switching the deck and tuner off.

When in the "standby" (Acc off) mode, the deck and tuner controllers' CPUs are shut down, but data in RAM is preserved. The system controller, however, continues to check the position of the Acc switch and to run the clock.
If the system controller detects the Acc switch to be in the "on" position for two seconds, it transmits a display command to the serial interface and transmits the display data which was stored before the Acc switch was moved to the "off" position. This data releases the deck and tuner controllers from the standby mode. If the unit was in the "deck" mode or "tuner" mode prior to the Acc switch having been moved to the "off" position, the unit is now returned to that mode.

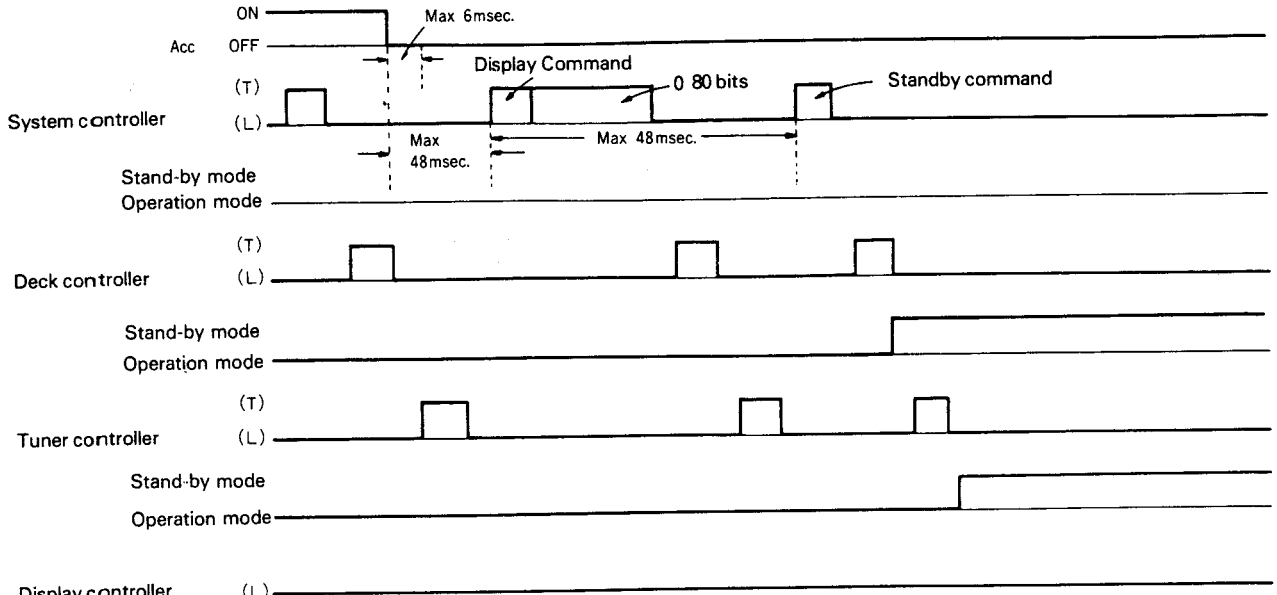


Fig. 15 Standby Mode Sequence

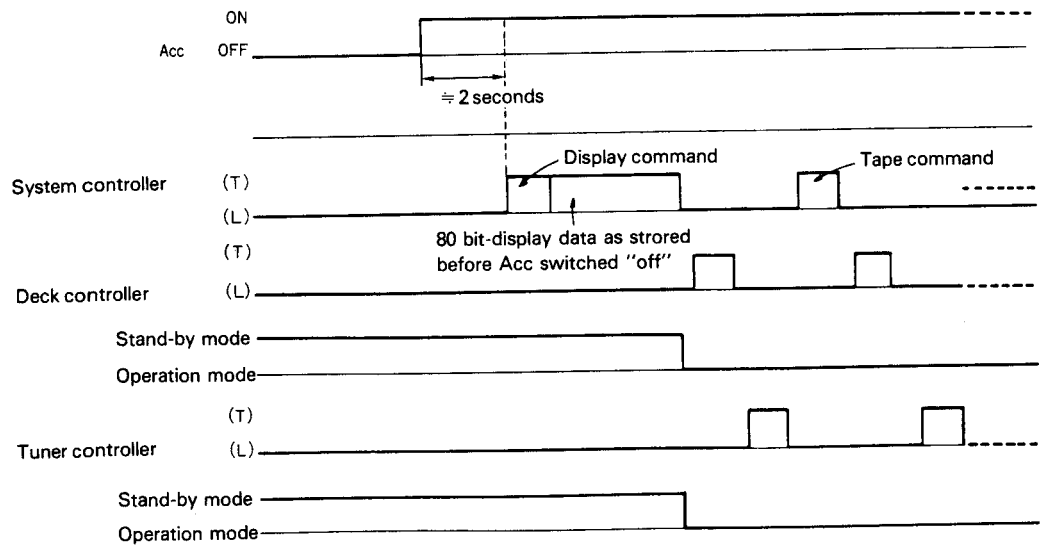


Fig. 16 Standby Release Sequence (When Unit Was in "Deck" Mode before Acc Switched "Off")

• Switching Between Tape and Tuner

1. Tape to Tuner (Figure 17)

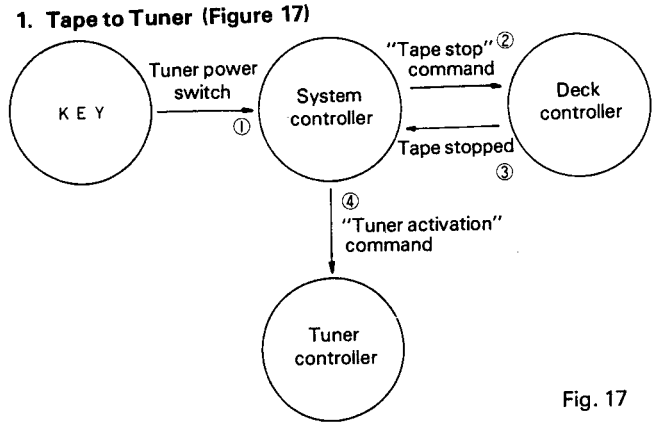


Fig. 17

If the "tuner power" switch is pressed while a tape is running, the system controller will send a "tape stop" command to the deck controller. When the system controller receives the "tape stopped" message from the deck controller, it will send a "tuner activation" command to the tuner controller, and the unit switches from the "tape" mode to the "tuner" mode.

2. **Tuner to Tape**

a. **Tape Power Switch Pressed**

If the "tape power" switch is pressed while the tuner is operating, the system controller will send a "stop tuner" to the tuner controller. When the system controller receives the "tuner stopped" signal from the tuner controller, it will send a "tape activation" command to the deck controller, and the unit switches from the "tuner" mode to the "tape" mode.

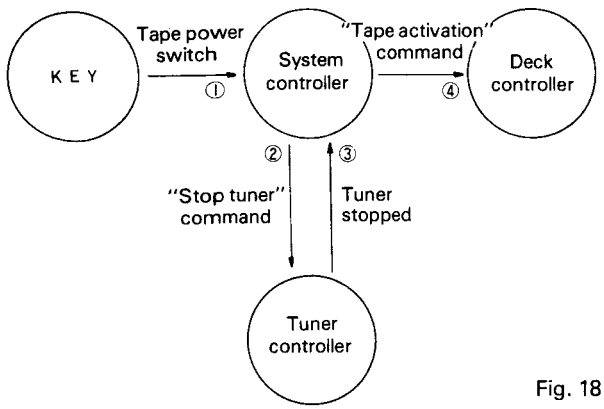


Fig. 18

b. **Cassette Inserted**

If a cassette is loaded while the tuner is operating, the deck controller will send a "tape activation" request message to the system controller. When the system controller receives this message, it will send a "stop tuner" command to the tuner controller. When the system controller receives the "tuner stopped" signal from the tuner controller, it will send a "tape activation" command to te deck controller. In this way, the unit automatically switches from the "tuner" mode to the "tape" mode when a cassette is loaded.

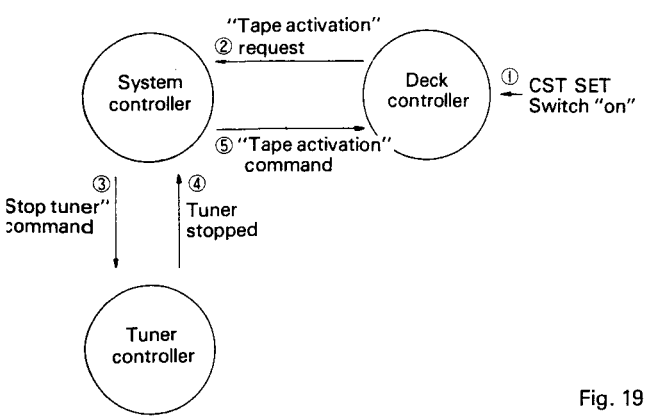


Fig. 19

• Drive system outline

The deck in this unit uses a motor drive, rather than the traditional solenoid. The drive system is composed of three motors: one providing power for the running and loading modes; one to drive the head base; and one to drive the "FF/REW" switching gear. Position sensing switches are arranged to correspond to each of the positions of the head base (FWD PLAY, REV PLAY, FF/REW & EJECT, and MS (music search)). Sensing switches are also arranged to correspond to each of the positions of the "FF/REW" switching gear (L (left), R (right), and CENTER)). Finally, two sensing switches are arranged to correspond to the LOADING and EJECT positions. Each of these positions is controlled by the "deck controller" (IC 6). Multipolar magnets are attached to each of the two reel spindles, and magnetic resistive device (MR 1, MR 2) are positioned to receive signals from these magnets indicating rotation.

The "deck driver" (IC 5) receives motor control signals from the deck controller and sends signals to drive each of the motors. The rotation of the reel unit is converted into an electrical signal, which is then "wave-form shaped" and converted into pulses and fed to the deck control section. When a music signal above a certain level is received from the audio section, a signal is sent to the deck controller in the form of a pulse (MS (music search)). In response to input from the keyboard or the tape insetion sensing switch, the deck controller sends a control signal for the appropriate motor to the deck driver. When a signal is received from a sensing switch that the deck has been set in a particular mode, a motor control signal is sent to the deck driver to turn the motor off. A reel pulse signal is used to detect the end of a tape, and to compensate reel unit over-run while in the MS mode.

• Electronic Volume Control

- Electronic volume control (IC 3) is carried out by serial transmission of data from the system controller (IC 7), allowing volume to be adjusted in 2 dB increments. The control signals from IC 7 pin 2 (DATA), pin 3 (CK) and pin 4 (ST) are as follows:

1. The data line transmits data concerning degree of damping and channel selection. This data is made up of 18 bits. (Fig. 20)
2. The CK line is for the clock signal.
3. A strobe signal latches volume data by causing the ST Line to go "H."

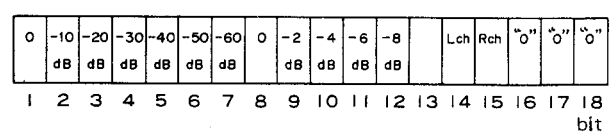


Fig. 20

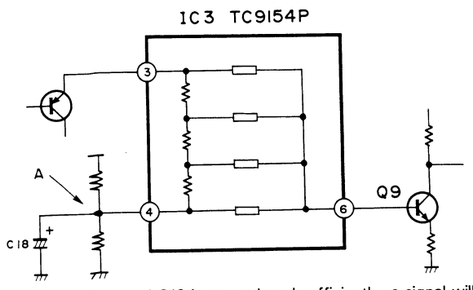
• Electronic Muting

The mute function electronically reduces volume. Consequently, in the MS mode, the audio signal does not go further than the volume control.

The mute circuit (Q407, Q408) in the stage part of the treble and bass circuits serves to prevent noise from developing between the latter part of the electronic volume and the bass and treble circuits.

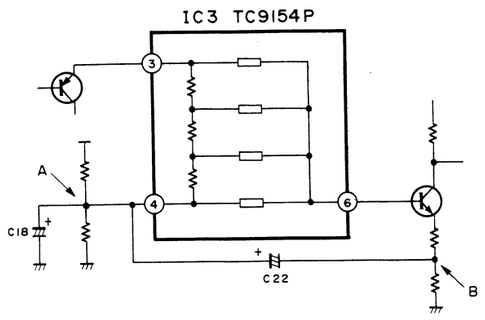
• Electron ic Volume Buffer Amplifier

The buffer amplifiers (Q9, Q10) which are connected to the end of the electronic volume control (pin 6, pin 11) increase the degree of muting by changing from the general circuit shown in Figure 21 to the circuit shown in Figure 22.



If the impedence of C18 is not reduced sufficiently, a signal will leak through even with volume reduced.

Fig. 21



The a.c. potential at points A and B is equalized by C22, thus increasing the degree of muting.

Fig. 22

• Reel Unit Rotation Pulse Detection Circuit

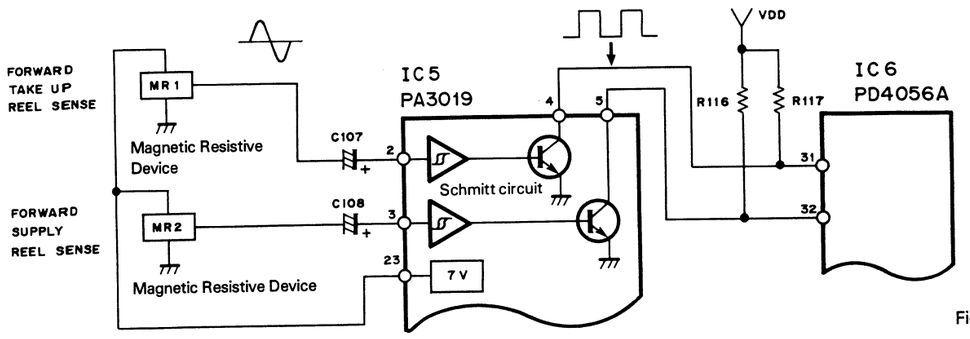


Fig. 23

- A continuous-wave is transmitted by the magnetic resistive device (MR 1, MR 2) as the reel unit rotates. This signal is formed into a wave pattern in the Schmitt circuit within IC 5, and a square wave is output from pins 4 and 5 (IC 5) in synchronization with the rotation of the reel unit. When rotation stops, potential is fixed at 0 or 5 volts.

1. **Tape end detector:** When in the forward play mode, the forward take-up reel is monitored. When in the reverse play mode, the forward supply reel (reverse take-up reel) is monitored. When the reel stops, "direction change" occurs.
2. **ATSC:** While rewinding, when rotation of the reel unit on the side from which the tape is being supplied (the take-up side when in the forward play mode) is detected (8 pulses within 560 ms), the deck switches to the play mode.
3. **Reel motor racing detector:** As in the case of tape end detection, the take-up reel unit is monitored (forward take-up reel unit when in forward play, reverse take-up reel unit when in reverse play). When the number of revolutions per unit of time exceeds the determined level, the motor is stopped.
4. **MS overrun compensator:** When a blank spot on the tape is detected when RMS (rewind music search) is engaged, a stop message is sent to the mechanism, but overrun occurs due to inertia in the cassette and in the reel unit. The length of this overrun (number of revolutions) is monitored, and after switching to the play mode, volume is muted until that length of tape is played. When FMS (fast forward music search) is engaged, the start of the next piece is detected. The deck then switches automatically to RMS, and the actions described above take place.

• MS Circuit

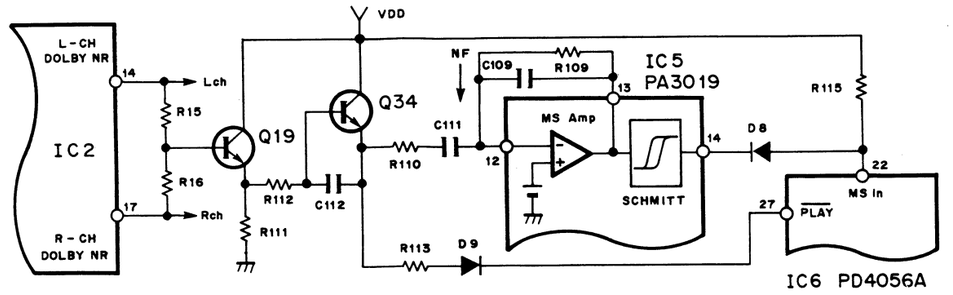


Fig. 24

The MS circuit detects blank spots on the tape. It consists of a filter, a differential MS amplifier (inside IC 5), and a Schmitt comparator (inside IC 5). The non-inverted input pin on the MS amplifier is fixed at a standard voltage inside the IC, and the inverted input pin is connected with the outside. The left and right output signals from the Dolby NR circuit are combined and transmitted to pin 12 of IC 5 after passing through the filter circuit. Pulses are generated at the output pin of the Schmitt comparator when recorded music exceeds a minimum amplitude. Music selection is then carried out by IC 6, which senses these pulses. The filter circuit switches between frequency response and gain when changing from the "Play" music selection mode to the "high speed" music selection mode.

1. **"Play" Music Selection (Equivalent circuit diagram 25):** IC 6 pin 27 goes "Low", and Q34 and D9 go to the "on" position. Since Q34 is acting as an emitter follower at this time, its output impedance is sufficiently low compared with R110. The gain from either the left channel or the right channel to IC 5 pin 13 is approximately 45 dB. The low range cut off frequency is approximately 300 Hz and the high range cut off frequency is approximately 7 kHz.

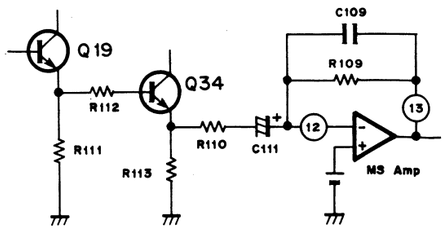


Fig. 25 Equivalent Circuit During "Play" Music Selection (Music Repeat, ect.)

2. **"FF" "REW" Music Selection (Equivalent circuit diagram 26):** IC 6 pin 27 goes "high", and Q34 and D9 go to "off." At this time, the gain is approximately 37 dB, the low range cut off frequency is approximately 4 kHz and the high range cut off is approximately 7 kHz.

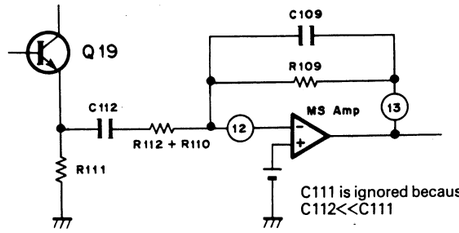


Fig. 26 Equivalent Circuit During the MS Mode

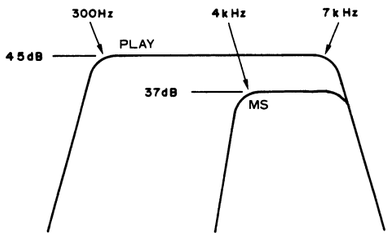


Fig. 27 Filter Characteristics

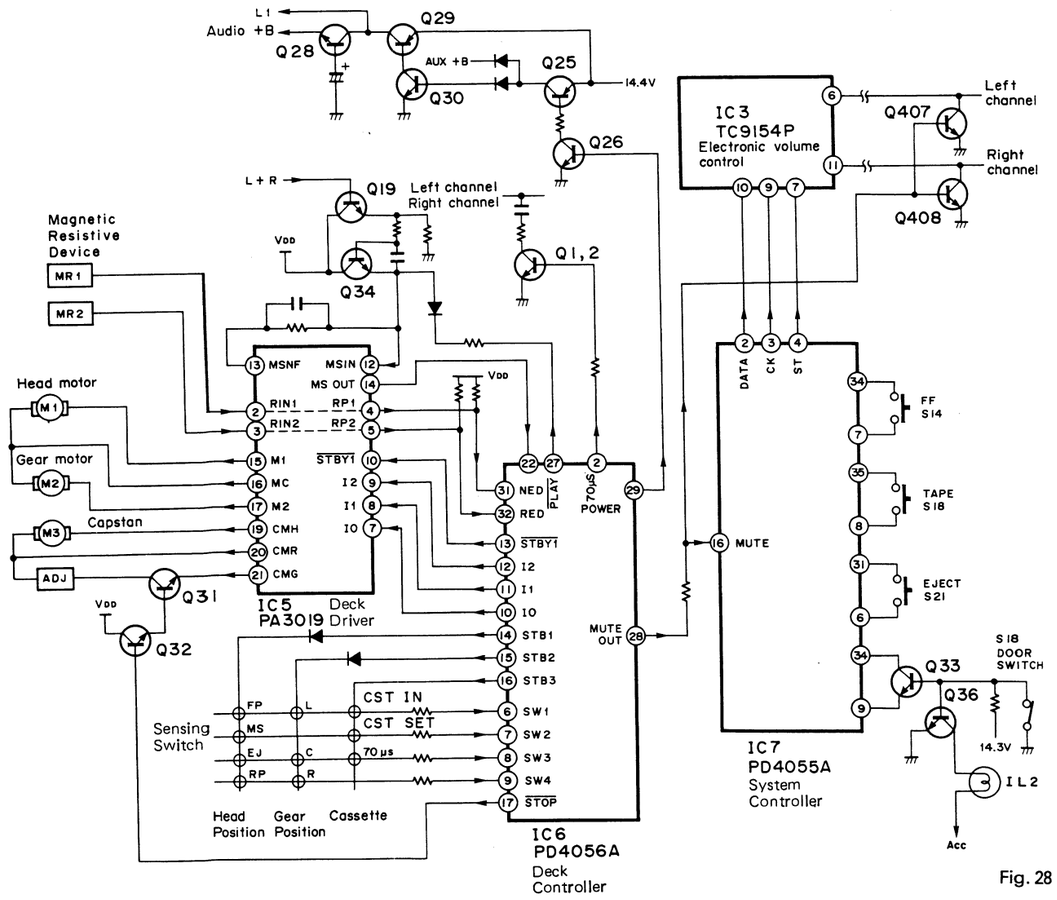


Fig. 28

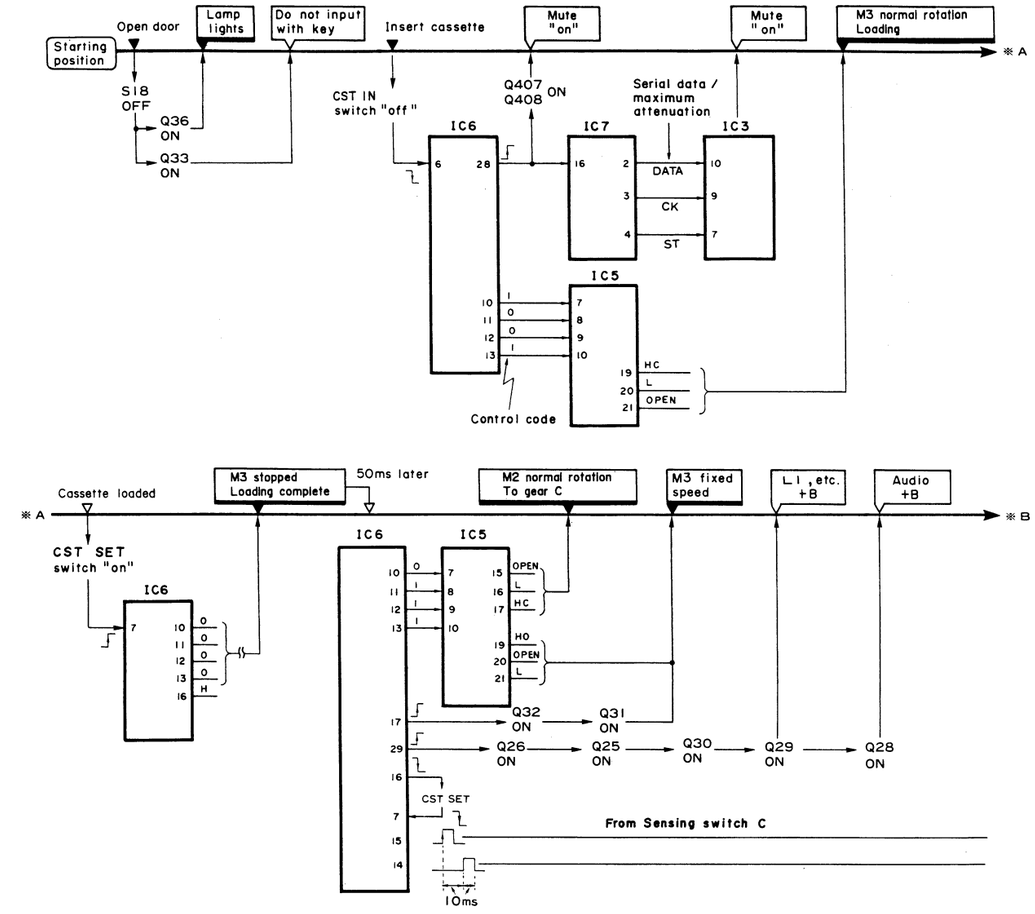
• Protection Circuits

Protection circuits operate in the following manner if one of the six problems described occurs:

1. If the tape should break while in the play mode, tape action will be released when the reel unit racing is detected.
2. If ATSC operation should continue for 10 seconds without stopping, it will be discontinued and the tape stopped. Normal action will resume if the tape is then ejected and a new tape inserted.
3. If a tape end is detected three times in 16 seconds, the deck will be stopped in order to protect the mechanism. If the "TAPE" button is then pressed, action will resume.
4. Detection of error in data communication.
   This unit operates by continually transmitting data between four ICs (integrated circuits). If something should cause noise to develop in the communication lines, causing an error in the data being transmitted, the deck and tuner will be shut down for two seconds, then returned to the state that they were in before the error developed.
   Note, however, that if the deck or tuner were in the "scan", "frequency up", "frequency down", or "music search" mode immediately prior to the error in data transmission, it will not be returned to that mode. Rather, the deck will enter the "play" mode and the tuner will be tuned to the last station being played.
5. If, for some reason, either loading or unloading should take longer than five seconds, the deck will switch to the opposite mode (loading in the case of unloading, and unloading in the case of loading). If the cassette should somehow become stuck, and the deck switches between loading and unloading three times with neither ejection nor loading taking place, the deck will shut down.
6. If, while the mechanism is operating, the head and gear motors do not go to their prescribed positions in two seconds, they will be released.

• Explanation of operation (Refer to Fig. 28)

1. Cassette insertion → forward play (deck was last run in forward direction; or, after resetting)

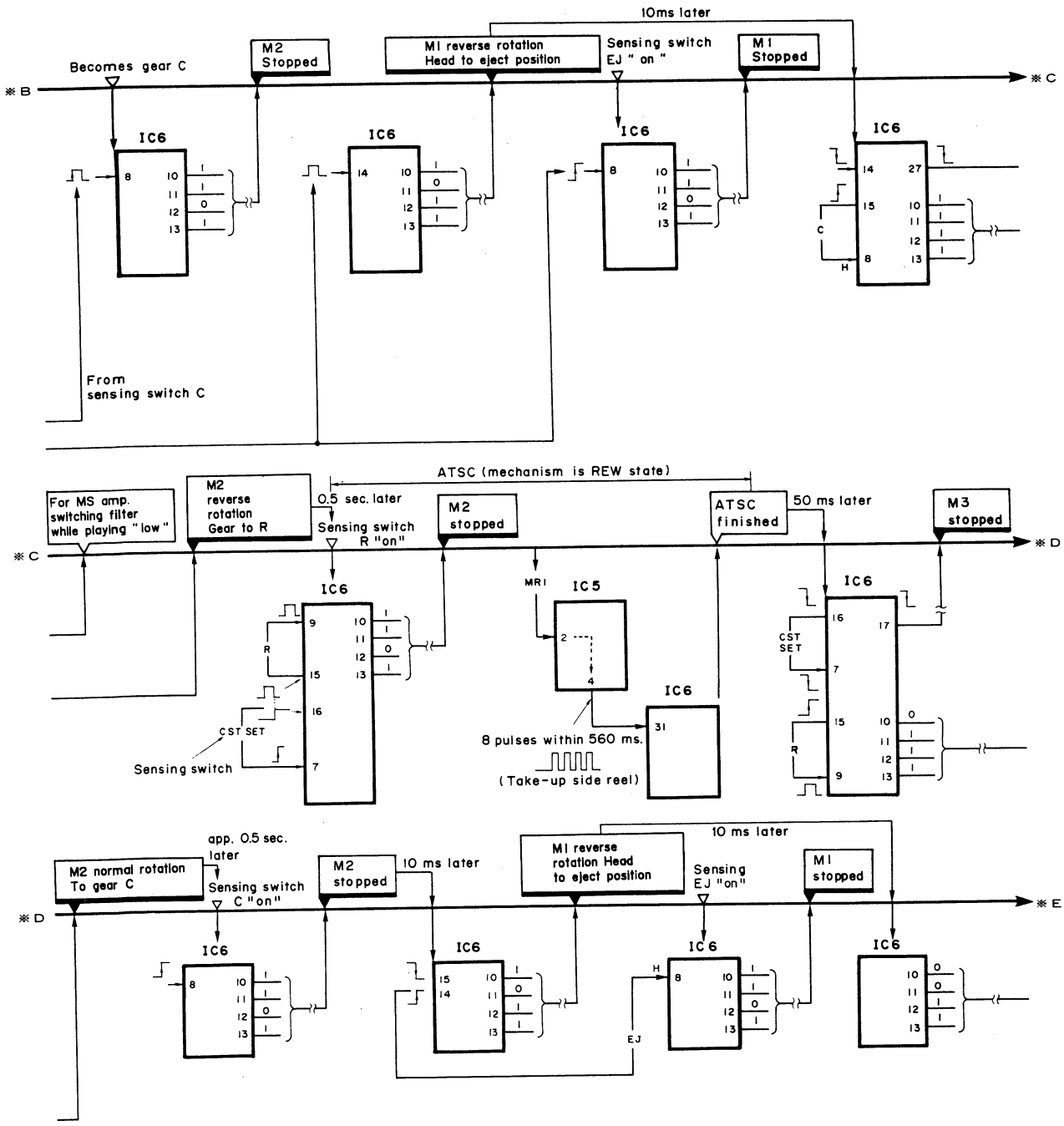


• Control code

IC6 PD4056A / **IC5 PA3019**

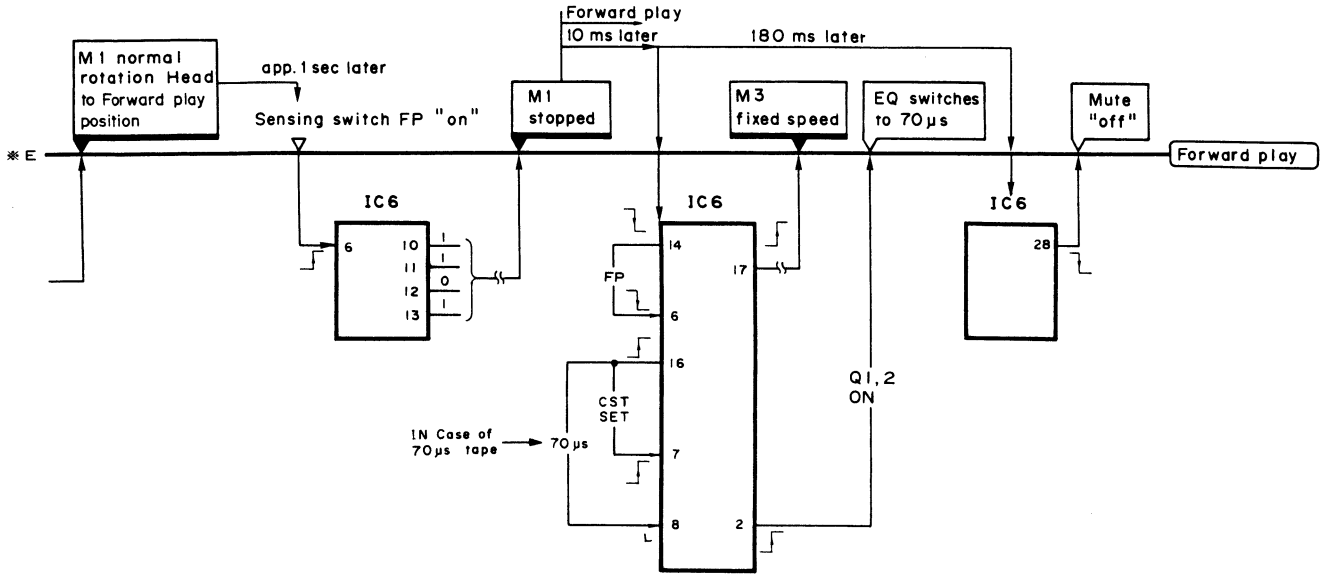
Control mode		Control code				Mechanism action	Output pin voltage					
		10	11	12	13		19*	20	21	15	16	17
Output "off"		0	0	0	0	Release	open	open	open	open	open	open
Normal		1	0	0	1	Loading	HC	L	↑	↑	↑	↑
M3	Reverse	0	1	0	1	Eject	L	HC	↑	↑	↑	↑
	Fixed speed	1	1	0	1	Normal operation	HO	open	L	↑	↑	↑
M1	Normal	0	0	1	1	Head in forward play direction	↑	↑	↑	HC	L	↑
	Reverse	1	0	1	1	Head in reverse play direction	↑	↑	↑	L	HC	↑
M2	Normal	0	1	1	1	Gear in left "L" direction	↑	↑	↑	Open	L	HC
	Reverse	1	1	1	1	Gear in right "R" direction	↑	↑	↑	↑	HC	L

HC.....app. 7V HO.....Vcc −1.7V Open.....high impedance L.....0V

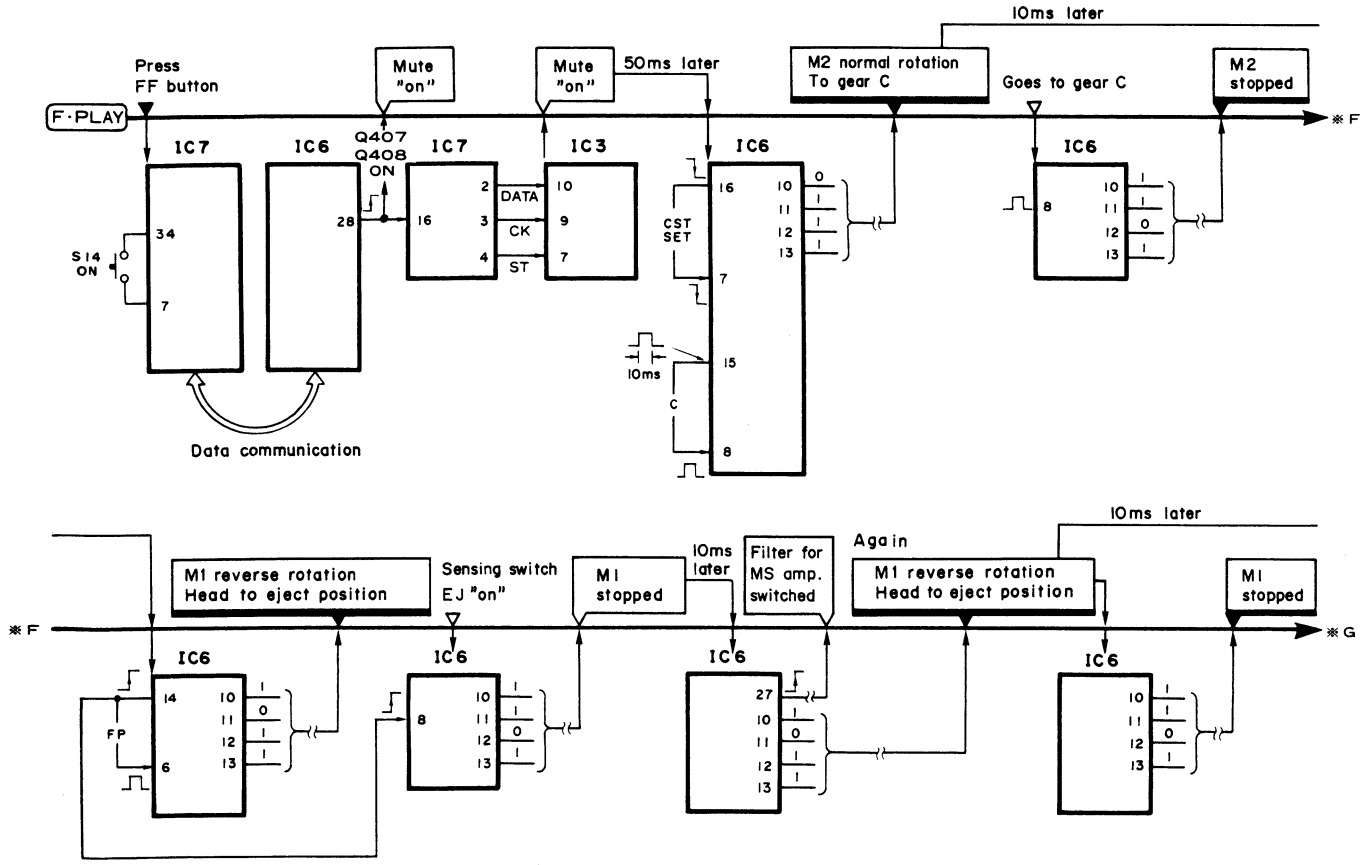


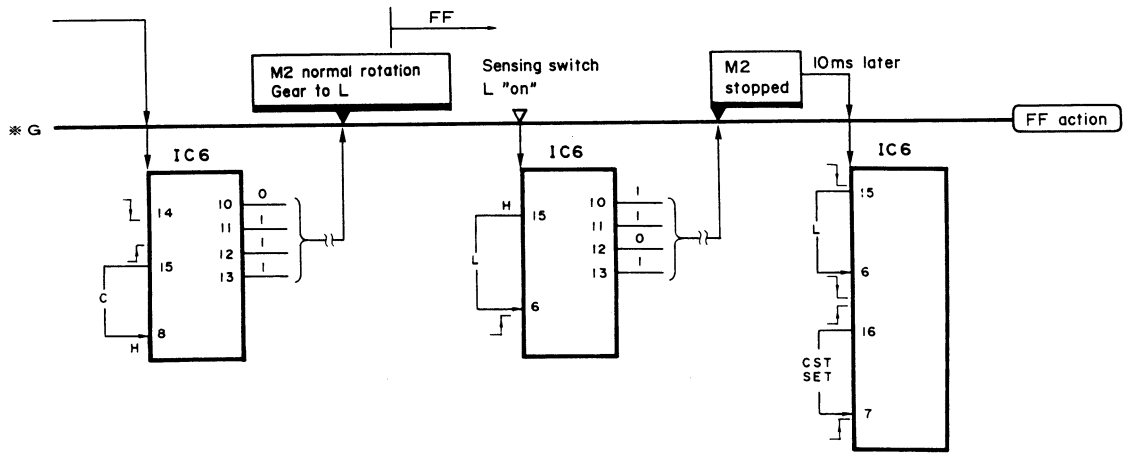
• **Sensing switch**

	Switch name	Description		Switch name	Description
Cassette state	CST IN	Turns "off" when cassette is inserted	Head position	FP	Forward play
	CST SET	Turns "on" when cassette is loaded		MS	MS
	70 μs	"off" for 70 μs tape		EJ	Eject
FF/REW gear position	L	FF when forward direction		RP	Reverse play
	C	Eject or play			
	R	REW when forward direction			

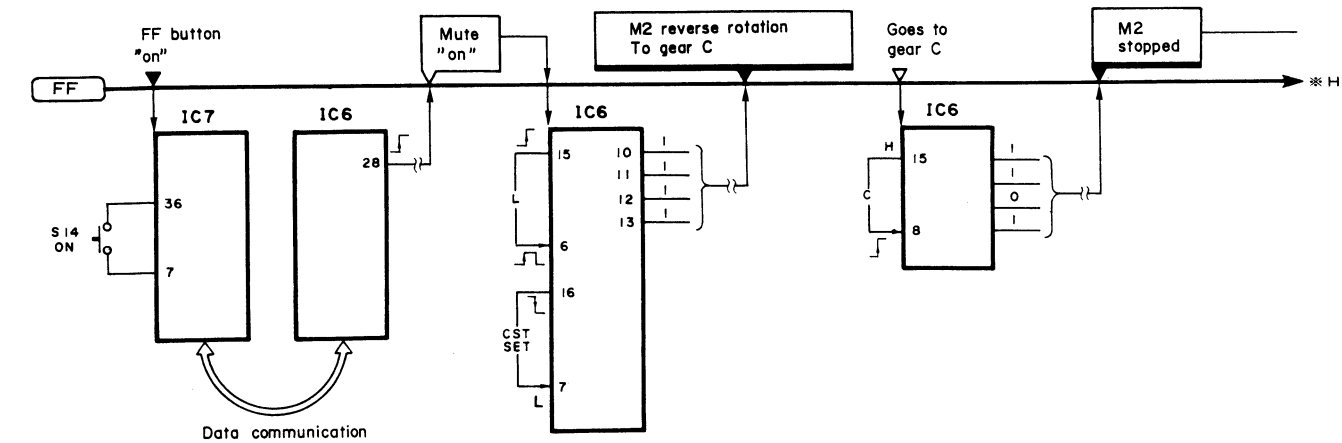

M1 normal rotation Head to Forward play position
app. 1 sec later
Sensing switch FP "on"
Forward play
10 ms later
180 ms later
M1 stopped
M3 fixed speed
EQ switches to 70µs
Mute "off"
Forward play
※E
IC6
FP
CST SET
IN Case of 70µs tape
70µs
Q1, 2 ON

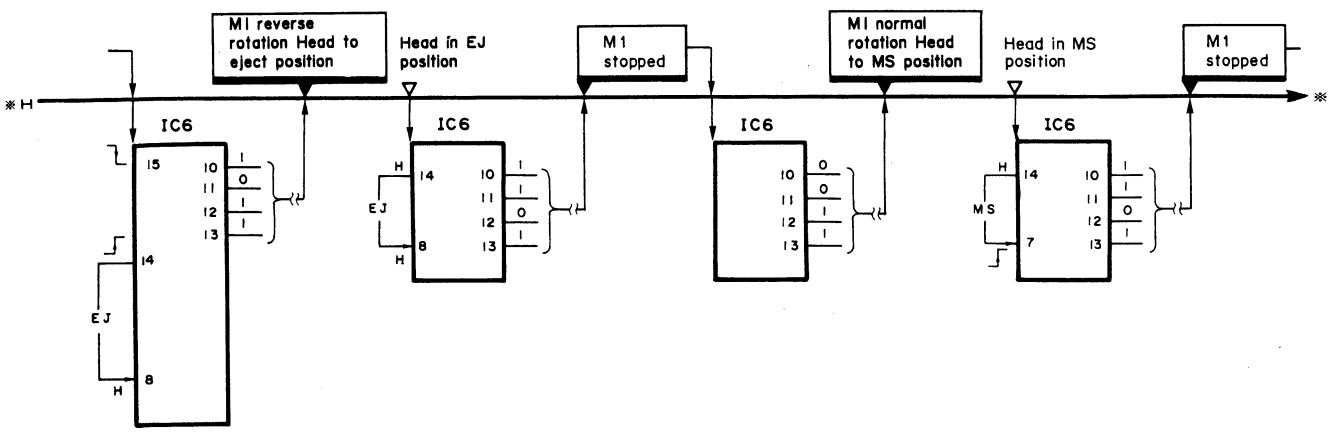
2. F·PLAY → FF

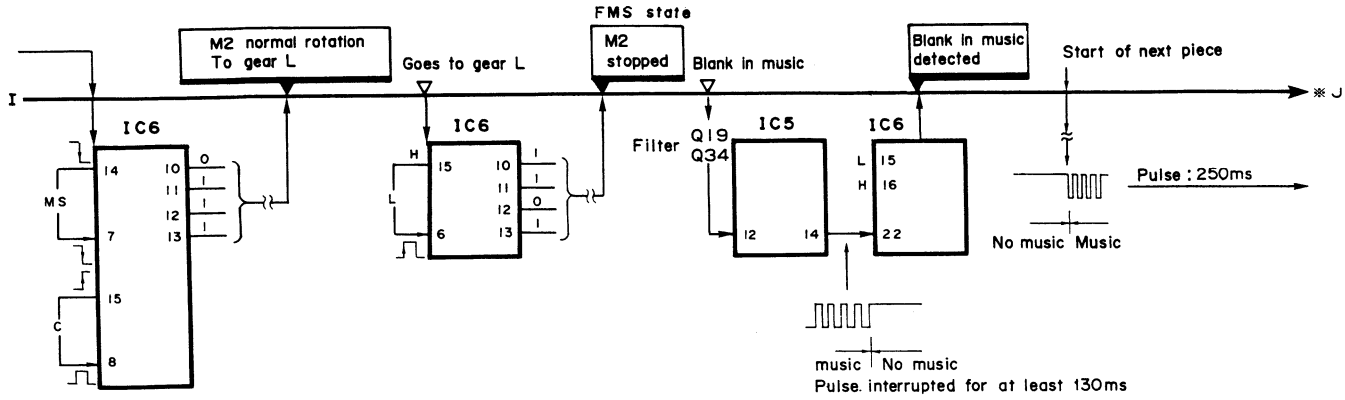

10ms later
Press FF button
Mute "on"
Mute "on"
50ms later
M2 normal rotation To gear C
Goes to gear C
M2 stopped
F·PLAY
※F
IC7
IC6
IC3
Q407 Q408 ON
S14 ON
DATA
CK
ST
CST SET
10ms
Data communication
M1 reverse rotation Head to eject position
Sensing switch EJ "on"
M1 stopped
10ms later
Filter for MS amp. switched
Again
M1 reverse rotation Head to eject position
M1 stopped
※G

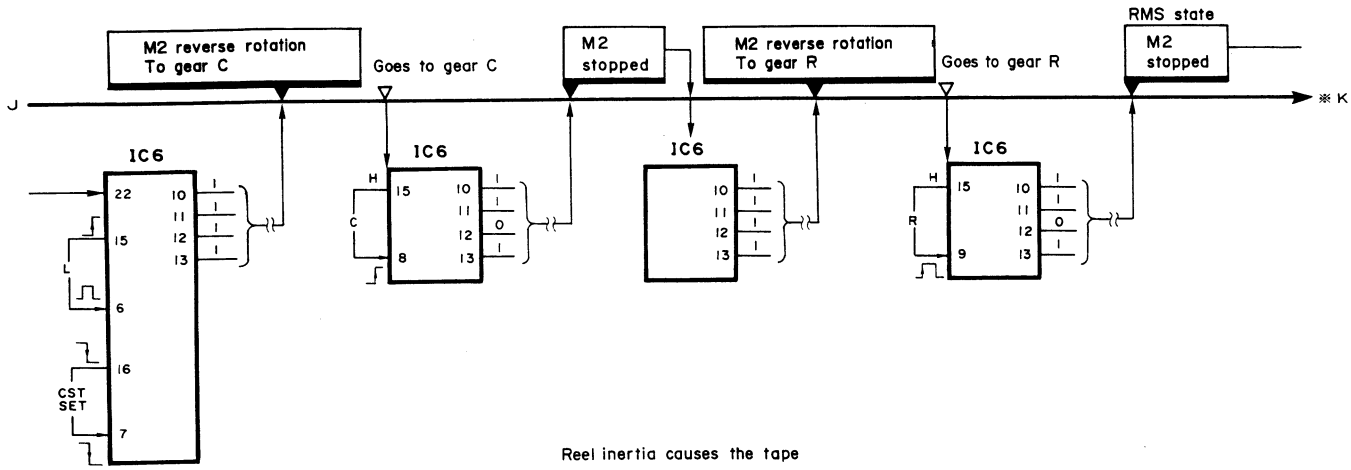

FF
M2 normal rotation
Gear to L
Sensing switch
L "on"
M2
stopped
10ms later
FF action
※G
IC6
IC6
IC6

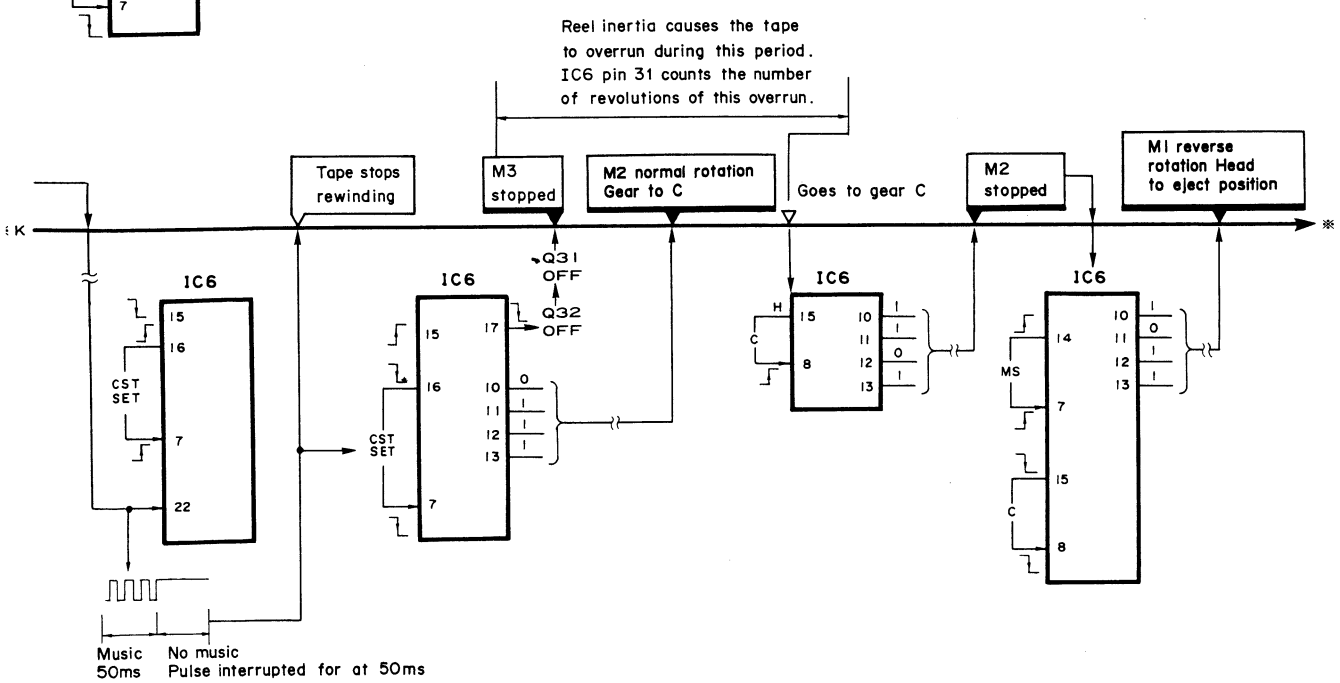
3. FF→F-MS

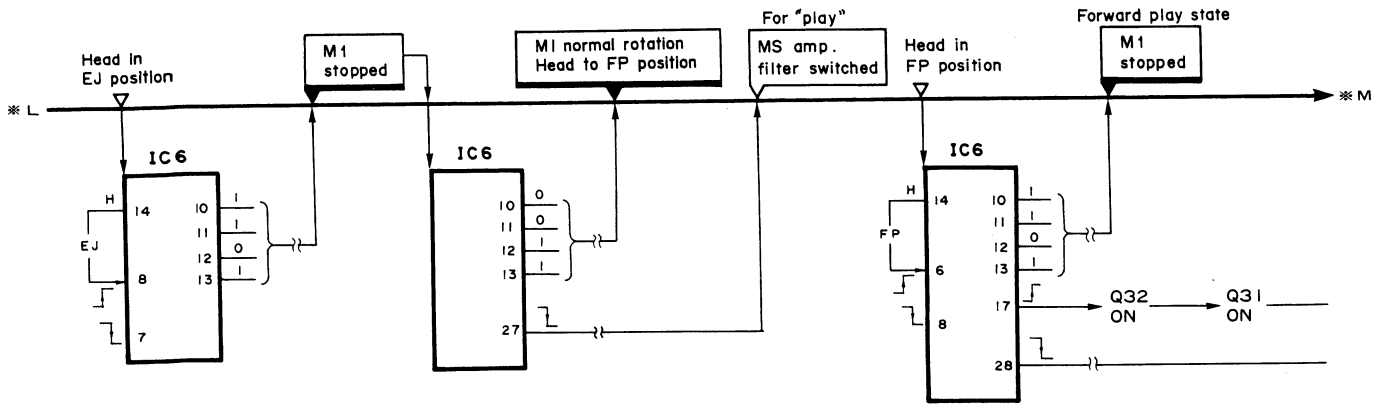

FF button
"on"
Mute
"on"
M2 reverse rotation
To gear C
Goes to
gear C
M2
stopped
FF
※H
IC7
IC6
IC6
IC6
S14
ON
CST
SET
Data communication

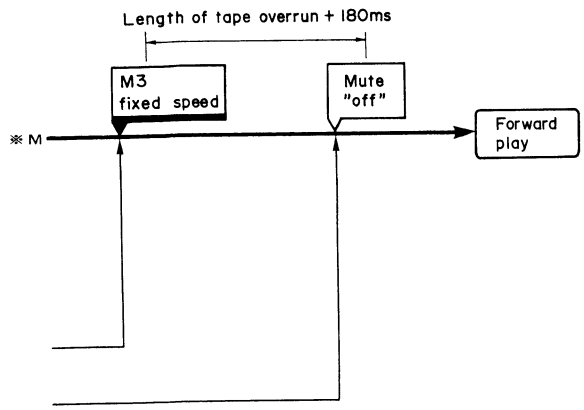

M1 reverse
rotation Head to
eject position
Head in EJ
position
M1
stopped
M1 normal
rotation Head
to MS position
Head in MS
position
M1
stopped
※H
※I
IC6
IC6
IC6
IC6
EJ
MS


FMS state
M2 normal rotation
To gear L
Goes to gear L
M2
stopped
Blank in music
Blank in music
detected
Start of next piece
I
※J
IC6
IC6
IC5
IC6
Filter
Q19
Q34
MS
Pulse : 250ms
No music
Music
music
No music
Pulse interrupted for at least 130ms

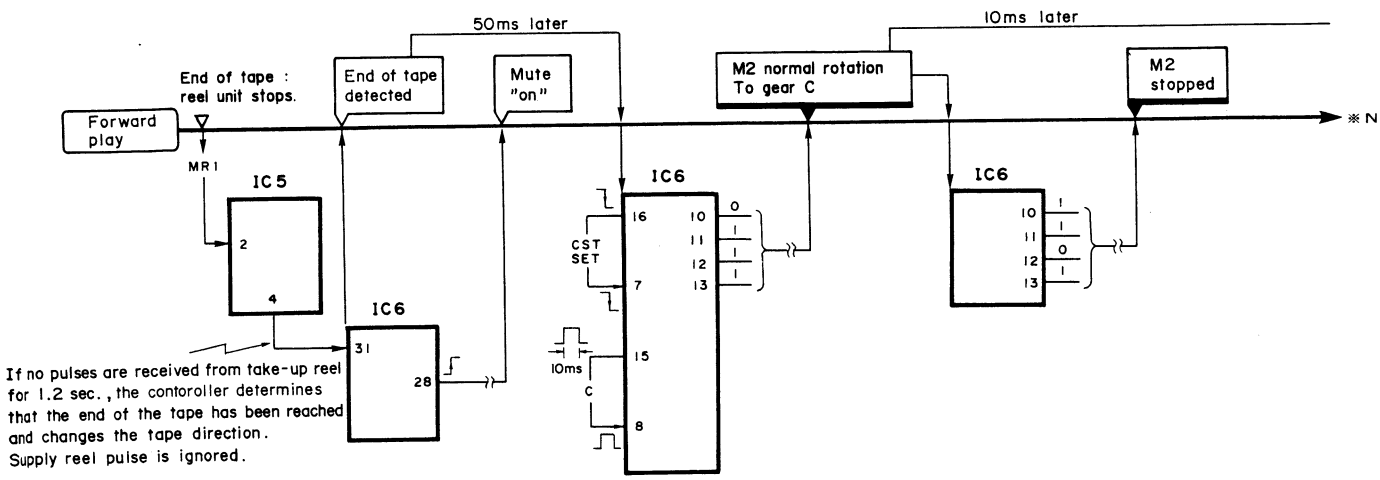

RMS state
M2 reverse rotation
To gear C
Goes to gear C
M2
stopped
M2 reverse rotation
To gear R
Goes to gear R
M2
stopped
J
※K
IC6
IC6
IC6
IC6
CST
SET

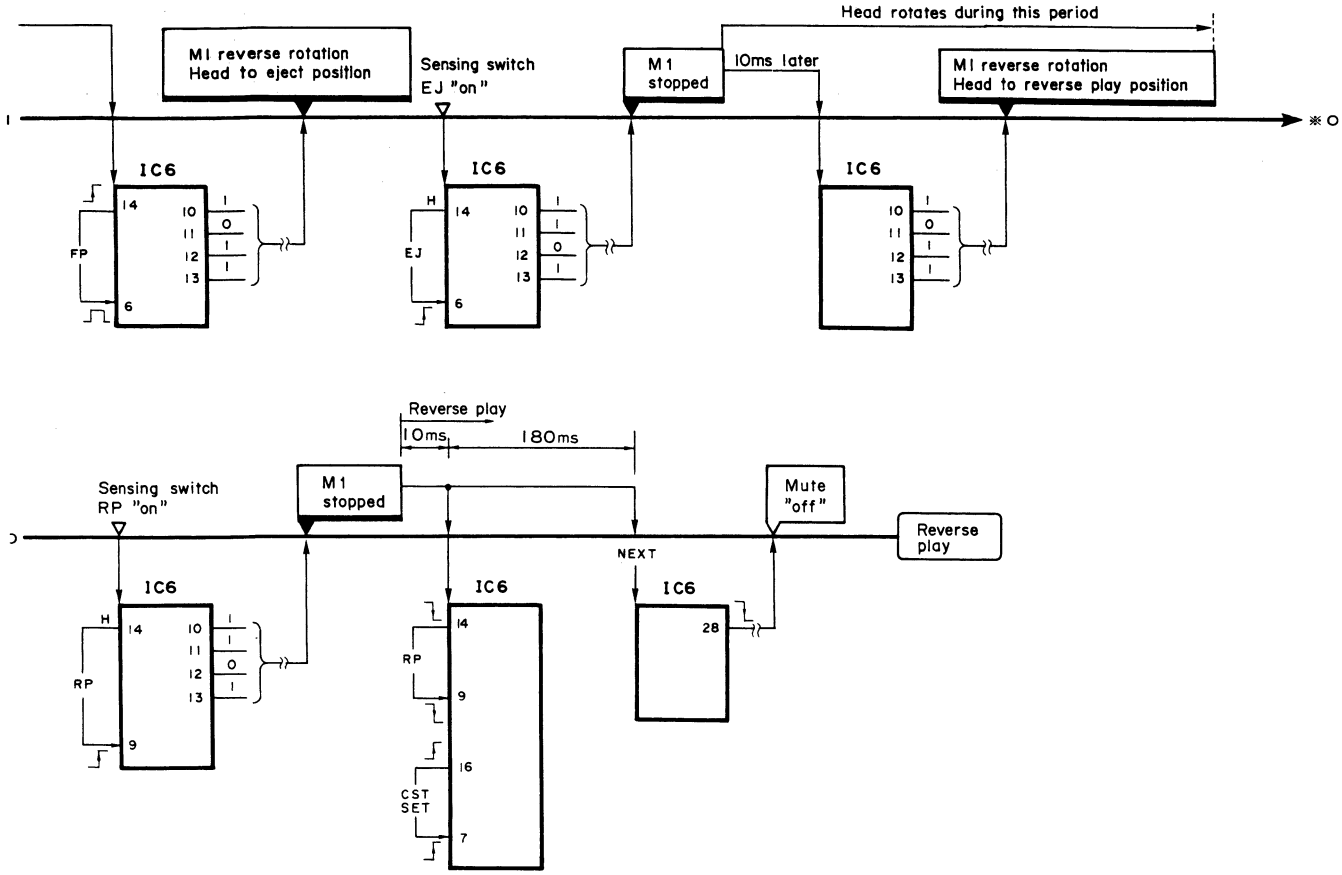

Reel inertia causes the tape
to overrun during this period.
IC6 pin 31 counts the number
of revolutions of this overrun.
Tape stops
rewinding
M3
stopped
M2 normal rotation
Gear to C
Goes to gear C
M2
stopped
M1 reverse
rotation Head
to eject position
※K
※L
IC6
IC6
IC6
IC6
Q31
OFF
Q32
OFF
CST
SET
CST
SET
MS
Music
50ms
No music
Pulse interrupted for at 50ms



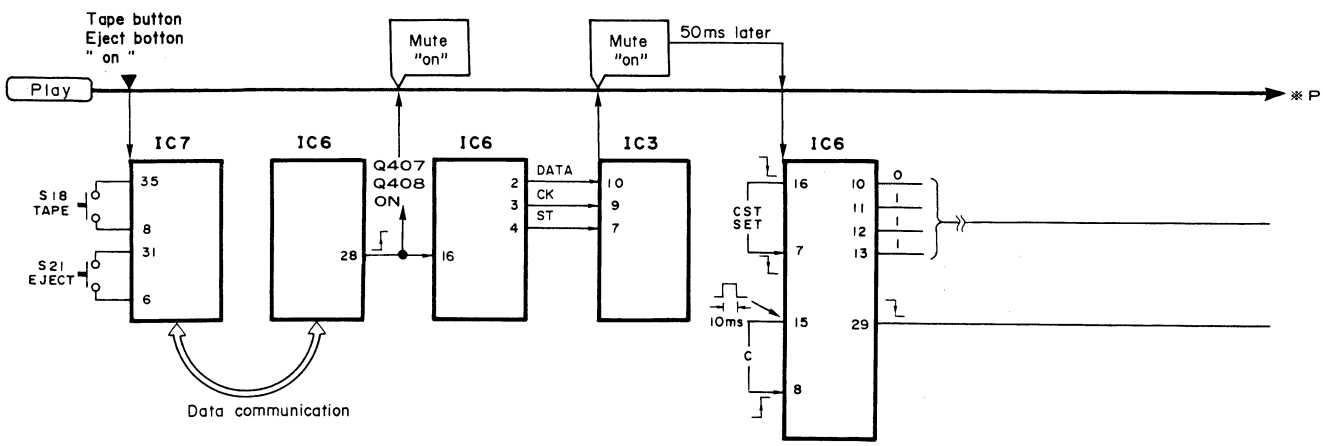


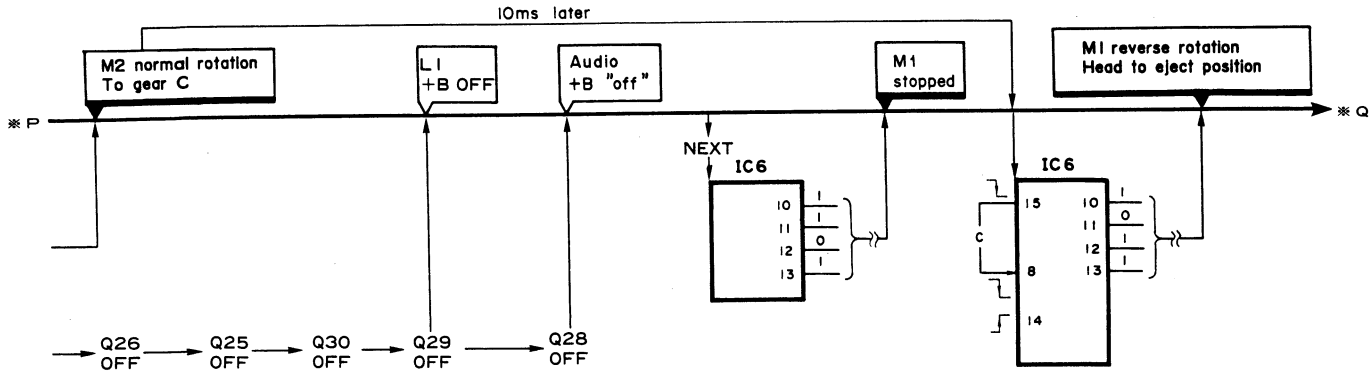
4. Forward Play → Reverse Play

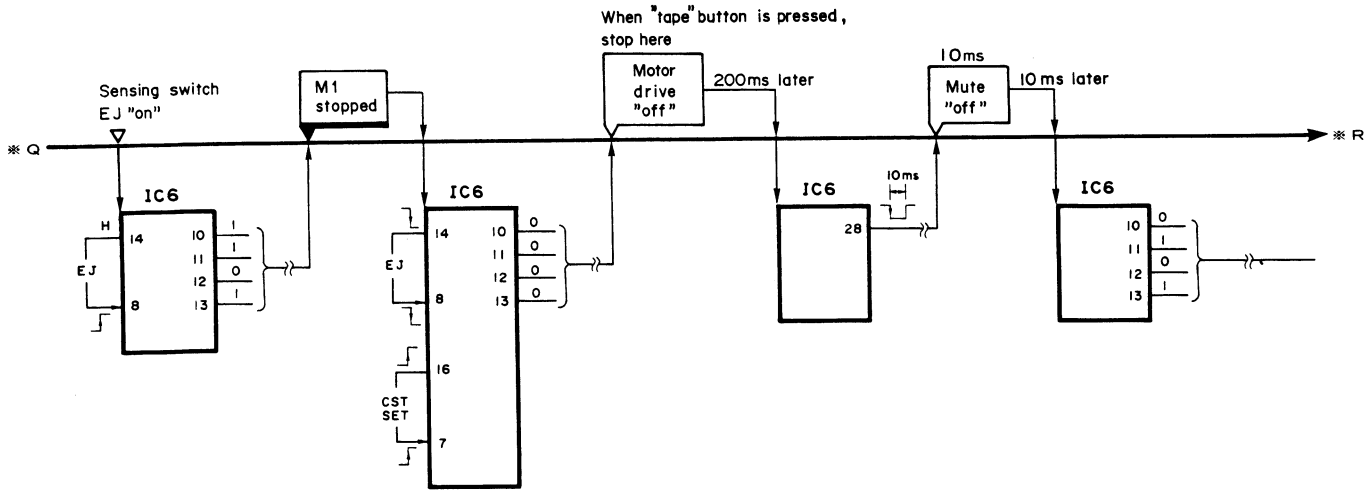


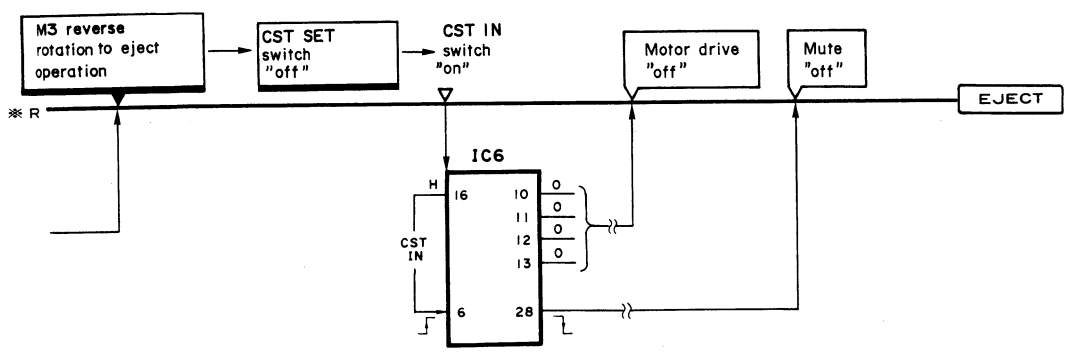

Head rotates during this period
M1 reverse rotation
Head to eject position
Sensing switch
EJ "on"
M1
stopped
10ms later
M1 reverse rotation
Head to reverse play position
※O
IC6
FP
EJ
H
Reverse play
10ms
180ms
Sensing switch
RP "on"
M1
stopped
Mute
"off"
Reverse
play
NEXT
RP
CST
SET

5. Play → Eject


Tape button
Eject botton
" on "
Play
Mute
"on"
Mute
"on"
50ms later
※P
IC7
IC6
IC6
IC3
IC6
S18
TAPE
S21
EJECT
Q407
Q408
ON
DATA
CK
ST
CST
SET
10ms
Data communication


10ms later
M2 normal rotation
To gear C
L1
+B OFF
Audio
+B "off"
M1
stopped
M1 reverse rotation
Head to eject position
※P
※Q
NEXT
IC6
IC6
Q26
OFF
Q25
OFF
Q30
OFF
Q29
OFF
Q28
OFF


When "tape" button is pressed,
stop here
Sensing switch
EJ "on"
M1
stopped
Motor
drive
"off"
200ms later
10ms
Mute
"off"
10ms later
※Q
※R
IC6
IC6
IC6
IC6
EJ
CST
SET
10ms


M3 reverse
rotation to eject
operation
CST SET
switch
"off"
CST IN
switch
"on"
Motor drive
"off"
Mute
"off"
EJECT
※R
IC6
CST
IN

5.2 TUNER SECTION

1. FM Tuner Section

- **Front End**

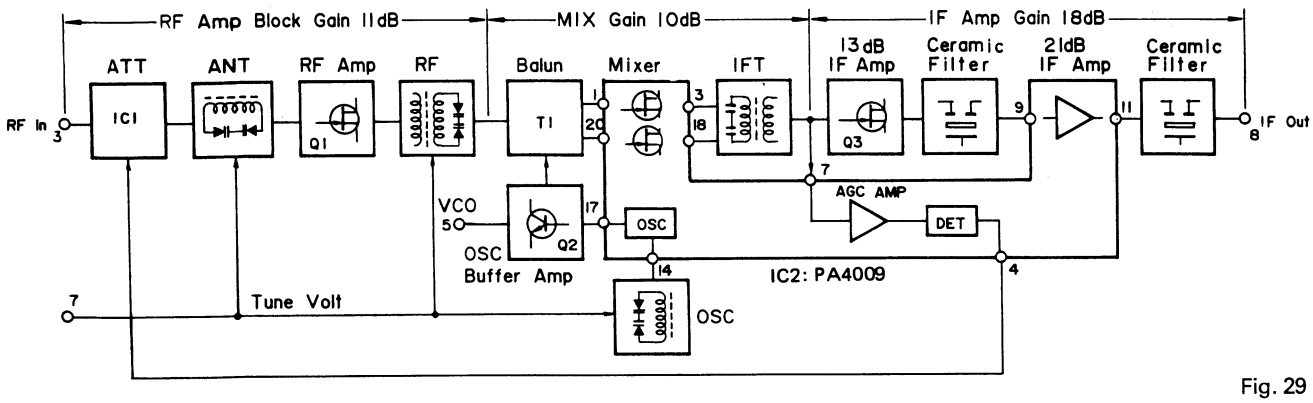


Fig. 29

The RF signal from the antenna passes through an attenuator constructed as a band-pass filter and is sent to the pi-shaped matching circuit, where high-end spurious response is improved. The signal then goes to the next stage, the RF amp. The RF amp employs a MOS FET capable of handling a wide dynamic range. The output from the RF amp passes through a parallel resonance circuit, is converted to a balanced signal from an unbalanced by a balun circuit and then goes to the mixer stage. This is a J-FET single balance type mixer which can accommodate a wide dynamic range. One of the IF signals from the mixer passes through the IF amp and ceramic filters. Another IF signal goes to the AGC amp. This AGC amp can operate even in the presence of interference signals. The AGC amp output is fed back to the RF attenuator circuit, forming a wide loop AGC. The AGC circuit operates at antenna input levels above 65 ±5dB.

- **IF Amplifier and Detector**

The IF signal (10.7MHz) output from the FM front-end is passed via a ceramic filter (CF1) to pin 1 of the IF amplifier detector IC1 (PA0013).
When there is no signal during the scanning operation, an output of 2 to 3V is obtained from pin 6 of IC1. Q5 is thus turned on, resulting in pin 41 of the control IC (IC10) being set to 0V to ensure that scanning is continued. When an input signal is received, pin 6 of IC1 is set to 0V, pin 41 of IC10 is set to "H", and scanning is stopped. A DC voltage which varies according to the level of the input signal is obtained from pin 17 of IC1, and is applied to pins 18 and 19 (stereo decoder output high-cut control pins) and pin 17 (separation pin) of IC3 (PA0015).

- **PNS Circuit**

IC2 (PA0014) is the FM noise canceller IC.

- **FM MPX Circuit**

IC3 (PA0015) is the PLL FM multiplex stereo decoder IC. When the composite stereo input signal accompanying the 19kHz pilot signal is applied, the VCO in the IC is locked to 19kHz and separates the left and right channel signals by the 38kHz switching signal.

- **ARC MK V**

In contrast to the earlier ARC MKIII (revised), control of separation and high-cut by both input level and input noise in the ARC MKV enables suppression of multipath noise when the input level is high. And when the input level is less than 35dB, the noise detector signal is stopped (for ARC by input level only).

2. Block Diagram

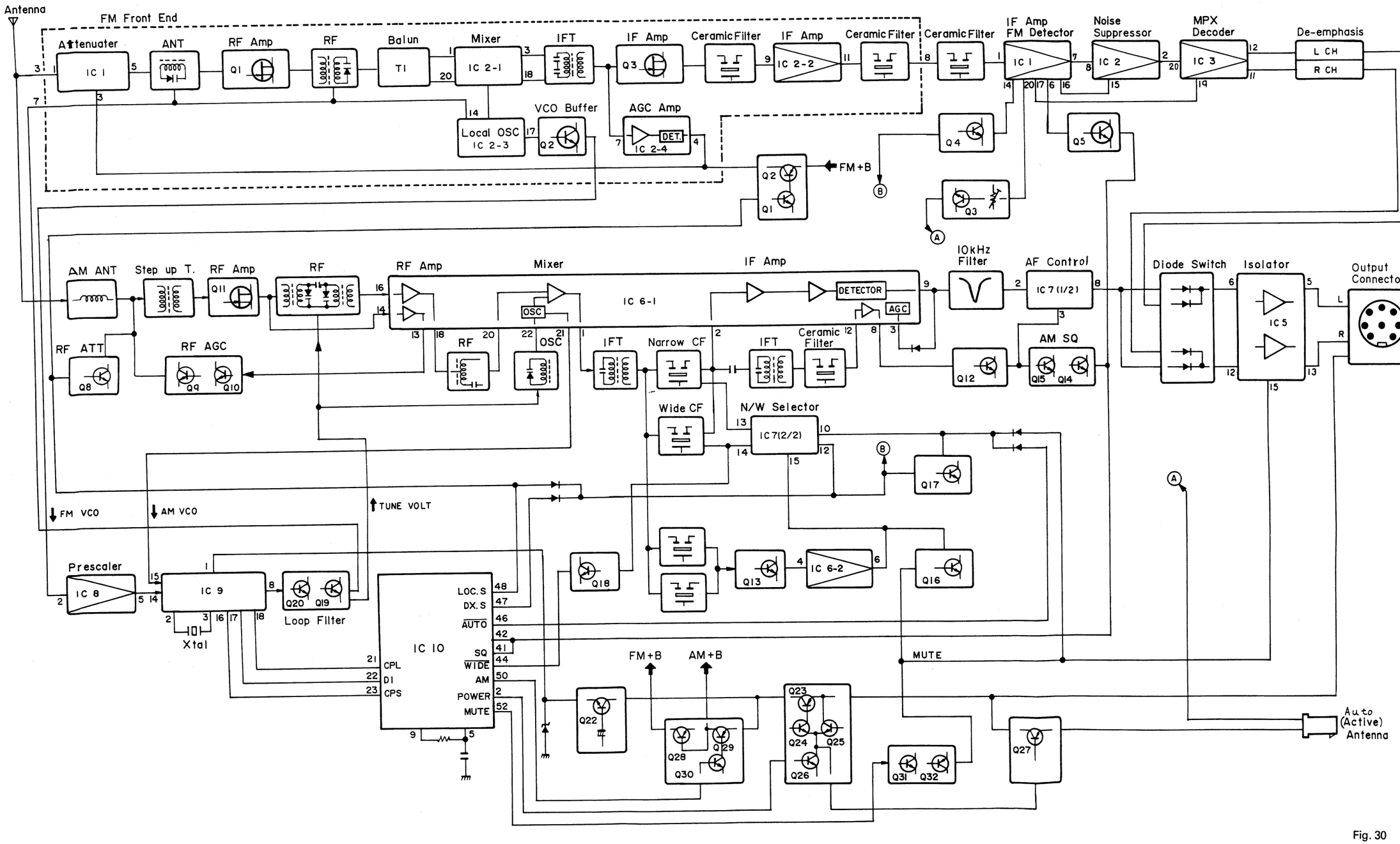
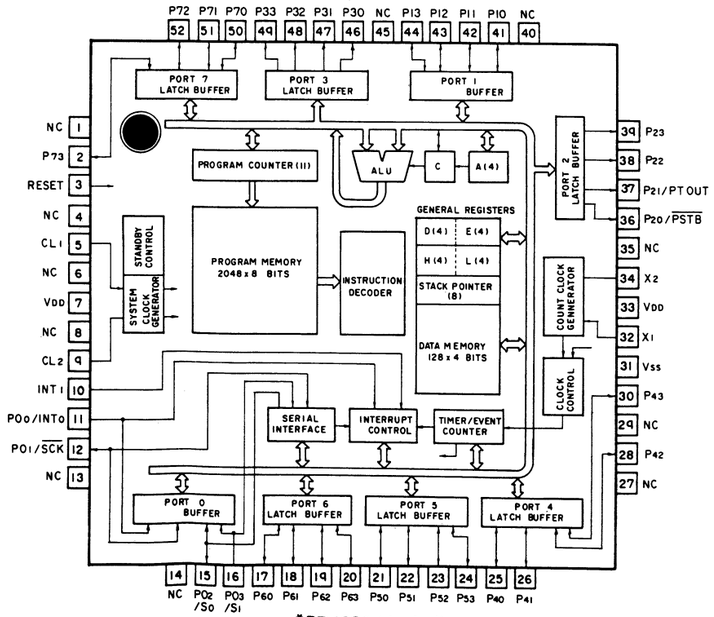


Fig. 30

3. AM Tuner Section

IC6 (PA3016) is a recently developed AM tuner IC. The sensitivity of the input signal from the antenna is increased by T6 (STEP UP coil). This input signal is received in the untuned condition by Q11 (FET), and is then selected and amplified by the double tuning circuit consisting of coils (T7 and T8), variable capacitors (D22-1 and D22-2), and trimmers (TC3 and TC4) before being applied to pin 16 (the ICs internal RF amplifier input). The output signal from pin 18 is applied to pin 20 which is the input pin for the ICs internal frequency converter circuit. The frequency converted signal from pin 1 is passed via an IF coil (T10) to ceramic filters (CF6 and CF7) where beat is detected and subsequently amplified by Q13. This beat signal is then passed via pin 4 (BEAT DET IN) and pin 6 (BEAT DET OUT) of IC6 to pin 15 (BEAT IN) of IC7 (PA0007). WIDE or NARROW mode is selected in IC7 by comparison operation, resulting in the CF8 (WIDE) or CF9 (NARROW) ceramic filter being selected by the corresponding output instruction from pin 14 (WIDE) or pin 13 (NARROW). The IF coil (T10) output signal is thus passed in one or the other of the selected modes, the WIDE and NARROW band widths being selected automatically on the basis of the adjacent channel beat level. IF amplification and detection then occurs in IC6. The 10kHz unwanted components of the detected audio output signal are removed by a 10kHz notch filter (T12), and after being passed through a frequency response control circuit in the AM control IC (IC7), the audio signal is passed to the signal switching diode switch circuit.

4. Control Section



*PD4021 block diagram

Fig. 31

● Description of PA0007 Pin Functions

Pin No.	Pin Name	I/O	Function
1	GND		Ground pin
2	IN	Input	Audio input pin
3	Vc		Frequency response control voltage input pin
4	LPF-1		Low-pass filter capacitor connection pins
5	LPF-2		
6	LPF-3		
7	LPF-4		
8	OUT	Output	Audio output pin / bias voltage pin
9	Vcc		Power supply pin
10	NIN	Input	Enforced NARROW input pin
11	TIMING		NARROW time constant determined by C/R connected to these pins
12	WIN	Input	Enforced WIDE input pin
13	NOUT	Output	NARROW output pin
14	WOUT	Output	WIDE output pin
15	BEAT IN	Input	AUTO operation input pin
16	GND		Ground pin

● Description of PD4021 Pin Functions

Pin No.	Pin Name	I/O	Function
1	NC		(Not used)
2	P73(PŌW)	Output	"H" level output while tuner power supply is on.
3	RESET	Input	CPU hardware reset input. Active "H".
4	NC		(Not used)
5	CL1		System clock generator C/R connection pins.
6	NC		(Not used)
7	VDD		Power supply pin.
8	NC		(Not used)
9	CL2		System clock generator C/R connection pins.
10	INT1	Input	External interrupt input (not used).
11	INT0	Input	External interrupt input (not used).
12	P01/$\overline{SCK}$	Input/ Output	Serial interface shift clock input/output pin. Normally "H".
13	NC		(Not used)
14	NC		(Not used)
15	P02/S0	Output	Serial interface data output pin.
16	P03/SI	Input	Serial interface data input pin.
17~20	P60~P63	Input	Input ports (not used).
21	P50(CPL)	Output	PLL data latch pulse output pin. Active "H".
22	P51(DI)	Output	PLL data output pin. Active "H".
23	P52(CPS)	Output	PLL data shift clock output pin. Active "H".
24	P53	Output	Output port (not used).
25	P40($\overline{TEST}$)	Input	Test mode selector input pin. Normally "H", but switched to test mode when reset to "L".
26	P41(SQT)	Input	Squelch sensing time selector input pin. The interval of time up to execution of SQ sensing after PLL data output is selected in the following way. Interval set to 75ms by "H", or 50ms by "L".
27	NC		(Not used)
28	P42(AMSL)	Input	AM channel space selector pin (USA). 10kHz at "H", and 9kHz at "L".
29	NC		JAPAN/USA (not used).
30	P43(AREA)	Input	JAPAN/USA selector input pin. USA at "H", JAPAN at "L".
31	VSS		Power supply GND pin.
32	X1		Count clock generator circuit crystal oscillator connection pin (not used).
33	VDD		Power supply pin.
34	X2		Count clock generator circuit crystal oscillator connection pin (not used).
35	NC		(Not used).
36	P20	Output	Output port (not used).
37	P21(DCLK)	Output	D/D converter clock pulse output pin. 100Hz clock output generated when tuner power is on, and pin set to "L" when tuner power is off.
38、39	P22、P23	Output	Output ports (not used).
40	NC		(Not used).
41	P10(SQ)	Input	Squelch input pin. Active "H".
42	P11	Input	Input port (not used).
43	P12($\overline{STEREO}$)	Input	Stereo signal input for indicator. Active "L".
44	P13($\overline{WIDE}$)	Input	Wide signal input for indicator. Active "L".
45	NC		(Not used).
46	P30($\overline{AUTO}$)	Output	AM tuner band width switching control output. NARROW when "H", AUTO when "L".
47	P31(DX、S)	Output	Scanning sensitivity control output. "H" output during normal scanning. "L" when normal.
48	P32(LOC、S)	Output	Scanning sensitivity control output. "H" output during local scanning. Active "H".
49	P33	Output	Output port (not used).
50	P70(AM)	Output	AM tuner power supply control output. Active "H".
51	P71(FM)	Output	FM tuner power supply control output (not used). Active "H".
52	P72(MUTE)	Output	Muting output. Active "H".

• Description of μPD2819C Pin Functions

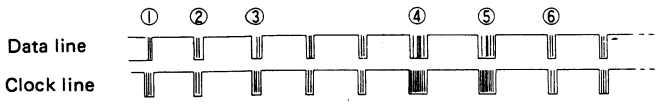
Pin No.	Pin Name	I/O	Function	Pin No.	Pin Name	I/O	Function
1	V_{DD}		Power supply pin.	10	CH2		Check pin 2 (programmable divider output).
2	XI		Crystal oscillator connector pins (5.76MHz).	11	AI	Input	Filter amplifier input.
3	X2			12	AO	Output	Filter amplifier output (open drain).
4	CKI	Output	Clock output pin 1 (360kHz) (open drain).	13	V_{SS}		Ground pin.
5	CK3		Check pin 3. (90kHz)	14	PI_1	Input	Programmable divider input 1.
6	CK2	Output	Clock output pin 2 (250Hz) (open drain).	15	PI_2	Input	Programmable divider input 2.
7	IS		Unlock detector pin.	16	CPS		Shift register clock pin.
8	EO	Output	Phase detector output (three state).	17	DI		Shift register data pin.
9	CHI		Check pin 1 (comparison frequency).	18	CPL		Latch clock pin.

• Description of μPB554C Pin Functions

Pin No.	Pin Name	I/O	Function	Pin No.	Pin Name	I/O	Function
1	V_{CC}		Power supply pin. (5 ±0.5V)	5	OUT	Output	Output pin.
2	IN	Input	VCO input pin.	6	M3	Input	Frequency divider control input.
3	CHK		Check pin. Normally connected to GND.	7	M2	Input	Frequency divider control input.
4	GND		Ground pin.	8	MI	Input	Frequency divider control input.

• PD4021 Operation

This IC is involved in data transmission with the system control IC (PD4023) and the deck control IC (PD4022A) for key input and display data output purposes.



① System controller command output
② Deck controller return output
③ Tuner controller return output
④ Tuner controller return and display data output
⑤ System controller display command and display data output
⑥ Deck controller return output

Fig. 32

1) Data transmission

Data output involves output of different commands from the system controller as indicated in Fig. 32, and output of return data in response to those commands to the deck controller and tuner controller via the data line. When the power is on, data is transferred constantly in the order indicated above. When the Acc power line is switched off, the system controller issues a command which instructs the other controllers to switch to low power consumption mode in which data transmission is stopped. In this mode, all PD4021 output pins are switched to "L" level.

Output of display data follows output of the return data in response to commands from the system controller. The system clock for use in serial data transmission is obtained from the controller which generates data outputs at 100kHz. Pin 15 serves as the data output pin, pin 16 as the data input pin, and pin 12 as the clock input/ output pin.

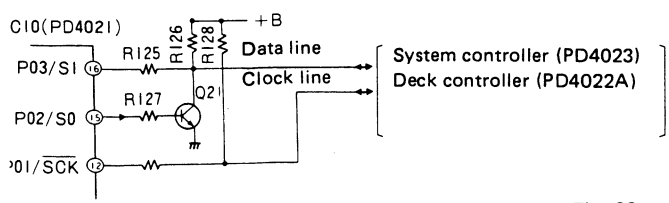


Fig. 33

2) PLL data output

Control data outputs from PD4021 are passed to the PLL IC9 (μPD2819) when the tuner is switched on, and when band switching, tuning, scanning, and memory call operations are executed. Data transfer involves output of data from pin 22 followed by output of a single shift clock from pin 23. Upon completion of output of all data, the transfer operation is terminated by output of a latch clock from pin 21.

3) AUTO/NARROW control output (pin 46)

The AM tuner band width switching output is "L" for AUTO mode and "H" for NARROW mode. (AM only) When the tuner is switched on in AM mode, or when the band is switched, or the tuned frequency is changed, an "H" level output (NARROW mode) is generated almost simultaneously with the muting output. This level is "L" during FM reception.

4) When the tuner is switched on

When the command from the system controller is received, pin 52 is switched to "H", followed by pin 50 or 51 and pin 2 also being switched to "H". And if in AM mode, pin 46 is also switched to "H" level at the same time. Subsequent output of PLL data is followed some 600msec later by pin 52 being switched to "L" level. When in AM mode, pin 46 is consequently switched to "H" or "L" depending on whether AUTO or NARROW mode has been selected. When the tuner is switched on, an output pulse of about 100Hz is passed to pin 37.

5) When the tuner is switched OFF

Pin 52 is switched to "H", and all output pins (apart from pins 12 and 15) are switched to "L", followed by pin 52 being switched back to "L".

6) Band switching

Pin 52 is switched to "H" and pins 50 and 51 are switched. If this switching is from FM mode to AM mode, pin 46 is also switched to "H" at the same time. Then approximately 600msec after output of PLL data, pin 52 is switched to "L", and if in the AM band, pin 46 is switched to "H" or "L" depending on whether AUTO mode or NARROW mode has been selected.

7) Manual tuning

The MUTE output is followed by output of PLL data. If in the AM band at this time, pin 46 is switched to "H", resulting in cancellation of the muted condition with a simultaneous return to the original status. If the button remains depressed for at least 0.5 second, fast scanning mode is activated, and PLL data output is obtained continuously at about every 100msec.

8) Scanning

Pin 47 or 48 is switched to "H" simultaneously with the MUTE output. And if already in AM mode, pin 46 is switched to "H". PLL output data is obtained about every 100msec, and when pin 41 is switched to "H" scanning is stopped, pin 47 or 48 is switched back to "L", and if in AM mode pin 46 is returned to the original status followed by cancellation of MUTE.

9) Memory call

Following the MUTE output, PLL data for stations stored in memory is obtained from the output, and MUTE is cancelled some 340msec later. If already in AM mode, pin 46 is switched to "H" by synchronizing with the MUTE output.

• Loop Filter Operation

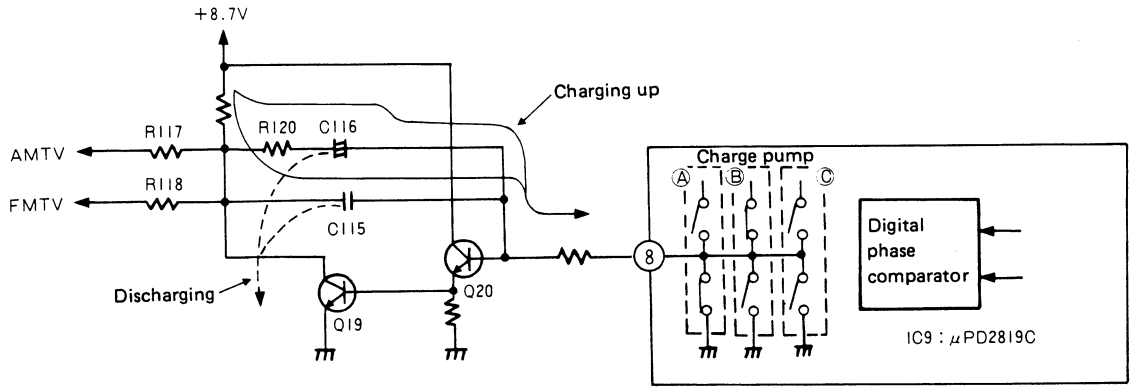


Fig. 34

Output of loop filter and IC9 (μPD2819C) data (from pin 8) is outlined in Fig. 34. The charge pump can be switched to three separate states (A, B, and C) by the switching elements controlled by the digital phase comparator. The loop filter (active low-pass filter) is one of the components included in the PLL circuit, and is operated in the following way.

(1) Attenuation of comparator reference frequency
The comparator reference frequency level is attenuated by the action of the active low-pass filter in order to improve the C/N ratio (carrier to noise ratio).

(2) Use in voltage conversion
Since the charge pump output (pin 8 output) forms a 5Vmax pulse, the tuning voltage cannot be adequately covered by simple C/R smoothing, and active filter capable of operating as an inverter is employed.

(3) Tuning voltage holding
The tuning voltage is maintained by charge pump switching and the combined capacitance of C115 and C116. At high frequencies, the charge pump is switched to (B) status by phase comparator, resulting in Q19 being turned on. The charge on C115 and C116 is thus discharged through R120 to reduce the tuning voltage and thus the frequency.

At low frequencies, the charge pump is switched to (A) status, resulting in Q19 being turned off. C115 and C116 are thus charged up by the +8.7V, thereby increasing the tuning voltage and the frequency. The tuning voltage is consequently maintained at a constant level by repeated switching to the (A) and (B) statuses. Although (C) status known as "floating" corresponds to when phase error is zero, the tuning voltage is actually held by high-speed switching of the (A) and (B) statuses.

- **FM Mode**

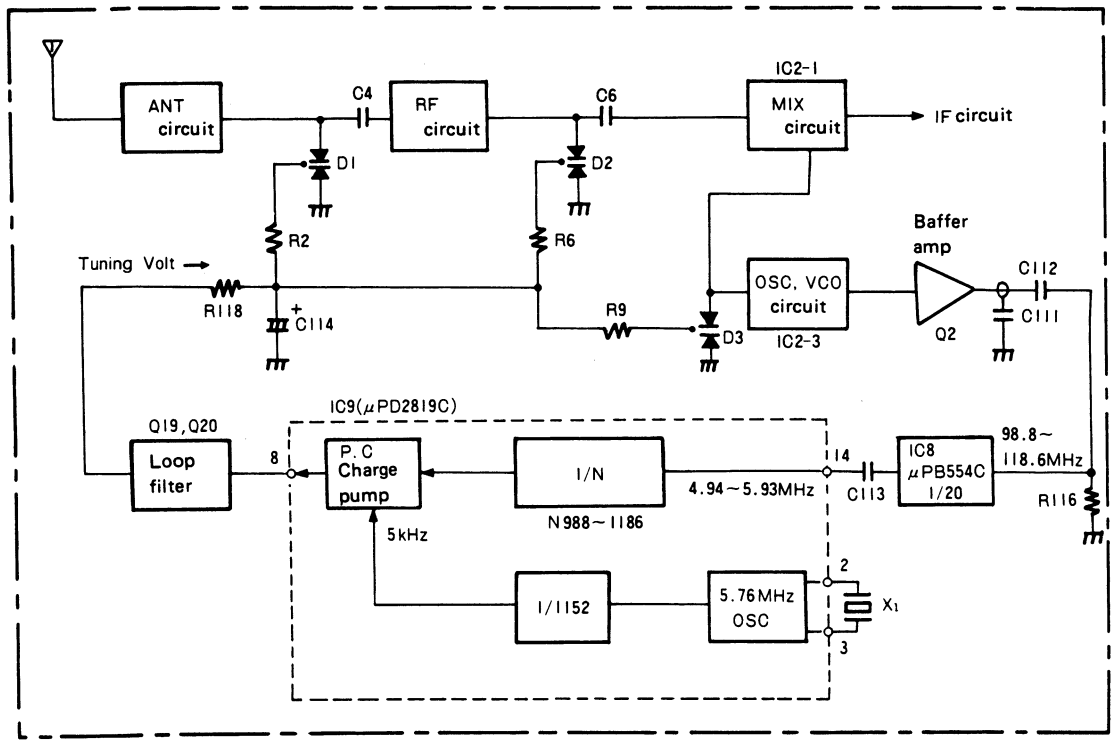


Fig. 35

- **AM Mode**

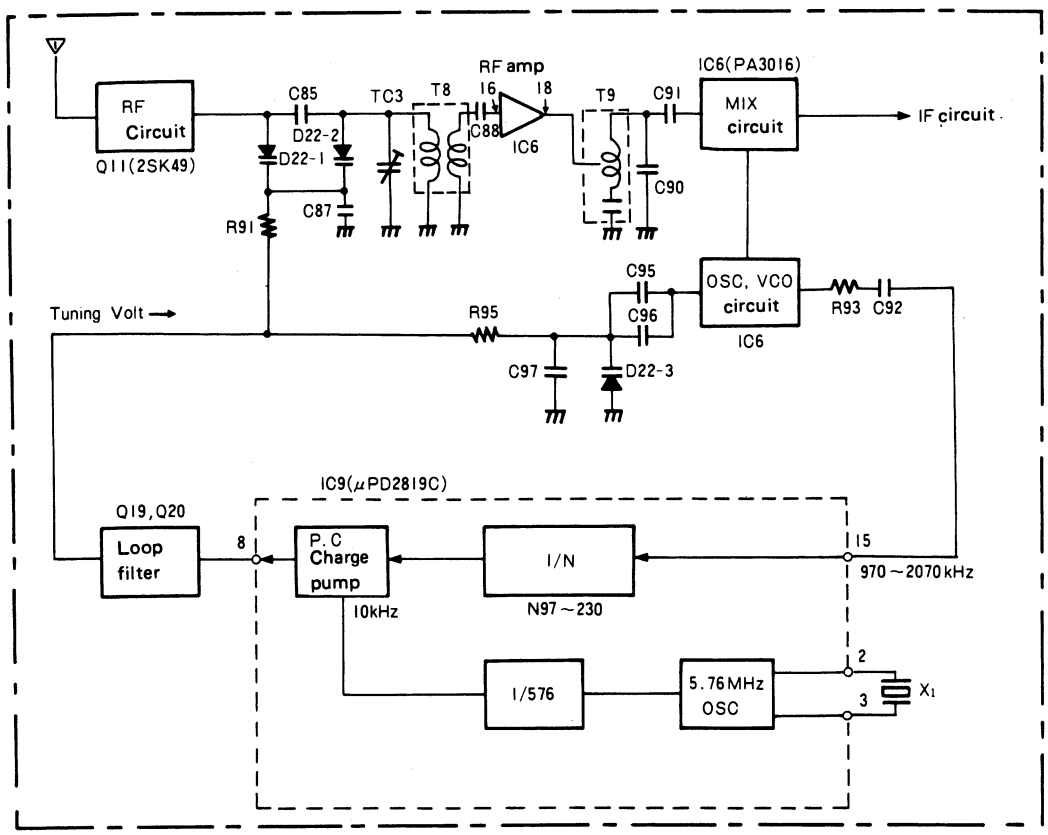
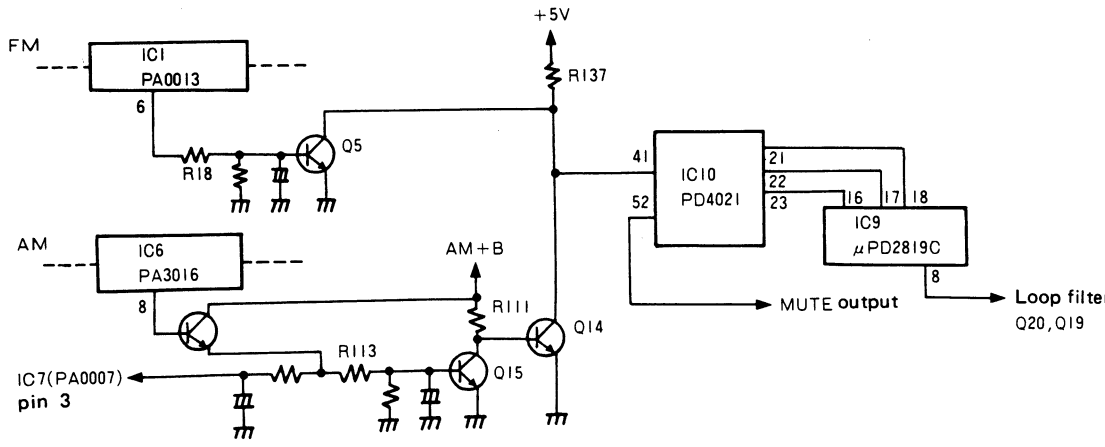


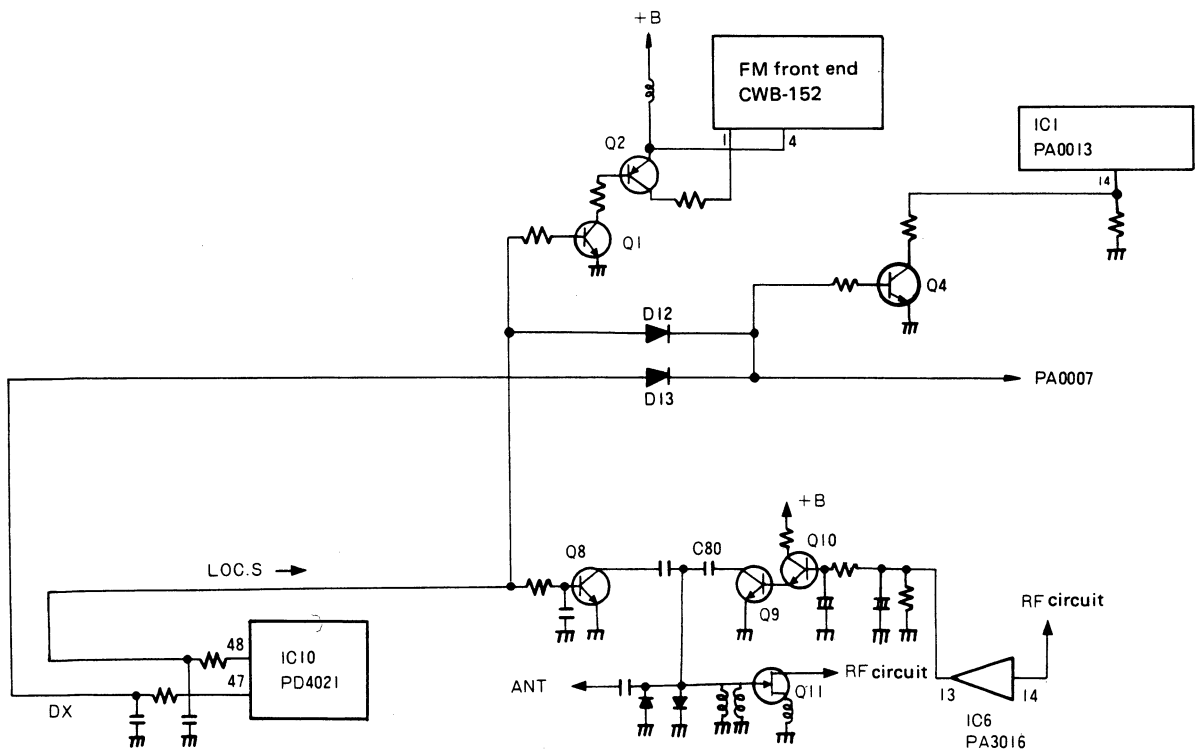
Fig. 36

• Description of Scanning Operation



Scanning stop peripheral circuit

Fig. 37



Scanning sensitivity peripheral circuit

Fig. 38

The peripheral circuits involved in scan stopping are shown in Fig. 37. When either of the scan buttons (UP or DOWN) is pressed, IC9 (μPD2819C) activates the UP/DOWN counter by data from control IC10 (PD4021) to commence the scanning operation. Each time the counter is changed by one step, the status of pin 41 of PD4021 is detected, and if the pin is at "H" level at that time, scanning is stopped. During the scanning operation a MUTE signal is obtained from pin 52 to activate the MUTE circuit. FM scanning is stopped by employing the muting drive pin (pin 6) of IC1 (PA0013). To cancel the MUTE status once a station has been tuned, pin 6 is switched to "L", Q5 is turned off, and pin 41 of IC10 is switched to "H", thereby halting the scanning. When in the DX position, stopping sensitivity is changed by controlling the voltage at pin 14 (mute adjustment pin) of IC1 by turning Q4 on. Scanning is stopped at an input level of about 25dB. In the LOCAL position, Q1 and Q2 are also turned on in addition to Q4, resulting in about 10mA being passed to pin 1 of the FM front-end to control the AGC gain. Scanning is therefore stopped at input levels of about 50dB.

While scanning is in progress, pin 47 or pin 48 of IC10 is switched to "H" when in that mode (that is, DX or LOCAL), and Q1 or Q4 is turned on to control the stopping sensitivity.

Scanning stop in AM makes use of the S meter output from pin 8 of IC6 (PA3016). This pin is switched to "H" when a station is tuned, and Q12 and Q15 are both turned on. And since Q14 is turned off and pin 41 of IC10 is switched to "H", scanning is stopped. The stopping sensitivity is determined by a signal passed through the narrow band filter, and the S meter output voltage adjustment (VR9) which is also used in frequency response control. During LOC.S scanning Q8 is turned on by the output voltage from pin 48 of IC10, and the signal from ANT is attenuated (by about 25dB) by C division, thereby determining the DX scanning sensitivity by the degree of attenuation.

5. Power Supply Circuit

When the tuner power is switched on, pin 2 of IC10 is changed to "H", Q26 is turned on, and a trigger is applied to Q24 to turn Q23 and then Q25 on. And when the Q23 collector reaches a certain voltage, the Q24 base potential is locked by R145 and D35, thereby enabling the Q25 base potential to reach much the same level as the Q24 base voltage. The Q23 voltage is consequently stabilized at about 8.7V according to the R147/R148 ratio.

AM/FM switching

When in the AM band, pin 50 of IC10 is at "H", Q30 and Q29 are on, and Q28 is off. Therefore, AM + B is passed via the power line. When in the FM band, Q30 and Q29 are off, Q28 is on, and FM + B is supplied as the power.

6. Muting Circuit

When pin 52 of IC10 is switched to "H", and Q31 and Q32 are turned on, the muting output is passed to the muting pin (pin 15) of IC5 (PA2014) to apply audio muting. Muting is also applied during "back up" when Q32 is turned on by a base current being passed through Q32 via D37 and R160.

When the tuner power switch is switched on, Q27 is turned on together with Q26. In addition to supplying an active antenna power supply, Q32 is turned off via D38 to cancel the muted status.

7. Audio Section

• Switching Circuit (D5 thru D8)

The FM/AM output audio signal is switched by a diode switching circuit, the desired signal being passed to the next stage.

• Isolator Circuit

The signal passed through the switching circuit is then passed through an isolator IC5 (PA2014) to LINE OUT. IC5 is also used in muting control.

6. ADJUSTMENT

6.1 DOLBY NR LEVEL ADJUSTMENT

• **Connection Diagram**

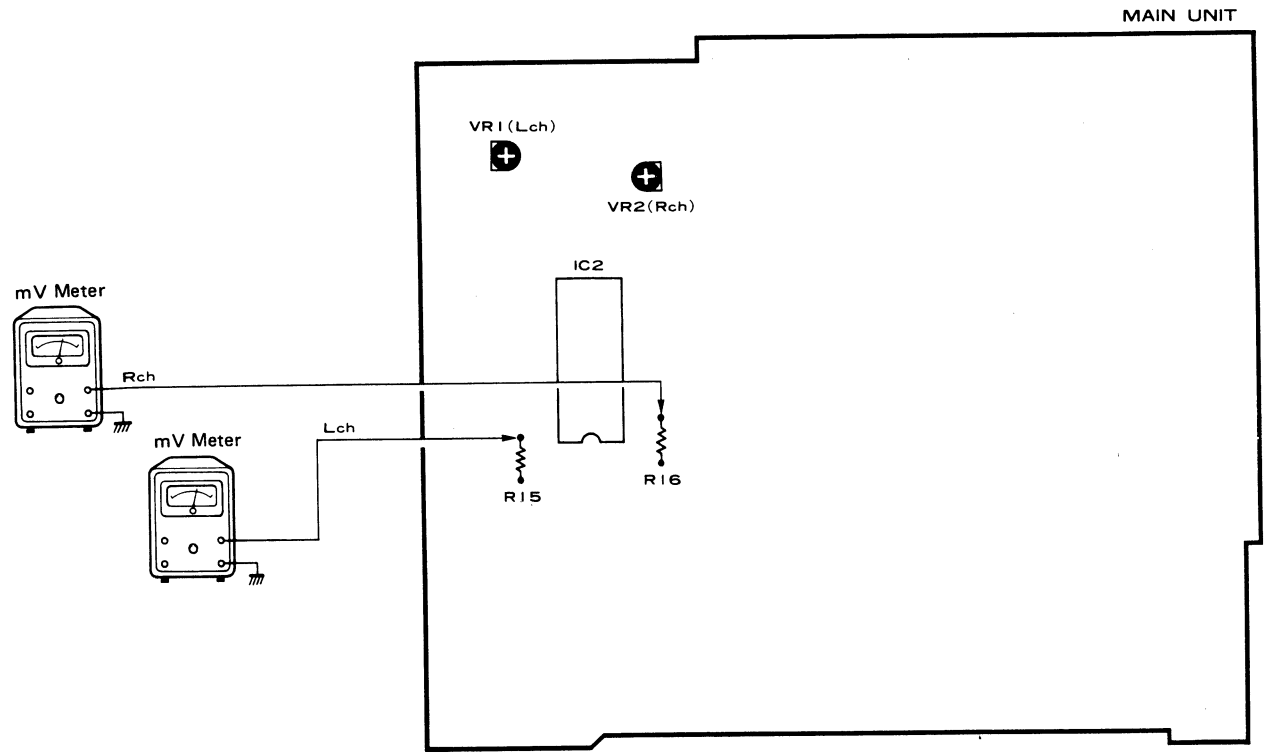


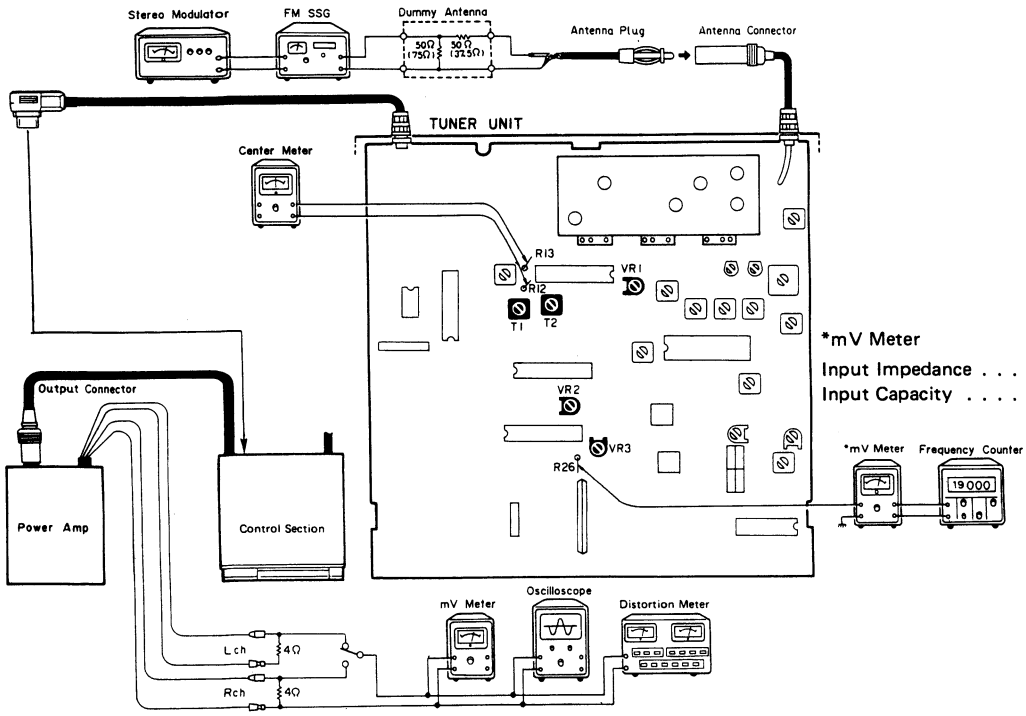
Fig. 39

• **To Adjust**

1. Set Dolby NR switch in "off" position.
2. Reproduce CT-150 (400 Hz, 200 nwb/m). Adjust VR 1 (left channel) and VR 2 (right channel) so that the mV meters show 300 mV. Adjustment accuracy should be ±1 dB.

6.2 FM IF ADJUSTMENT

- **Connection Diagram**



*mV Meter
Input Impedance . . . . . more than 1MΩ
Input Capacity . . . . . less than 100pF

Fig. 40

- **To Adjust**

1. Apply a 98MHz, 400Hz 100% modulated 60dB (μV) signal from the FM SSG, and tune the tuner to 98MHz.
2. Adjust T1 to obtain a 0 reading in the center meter.
3. Adjust T2 to the point of minimum distortion.

6.3 FM MPX ADJUSTMENT

- **Connection Diagram**

(Shown in Fig. 40)

- **To Adjust**

1. Apply a 98MHz 60dB (μV) unmodulated signal from the FM SSG, and adjust VR3 to obtain frequency counter reading of 19kHz ± 120Hz.
2. Apply the stereo signal (1kHz, 100% modulated), and adjust VR2 to the point of maximum separation.
3. Apply an input signal of 35dB (μV), and adjust VR1 to a separation of 5dB.

6.4 FM TRACKING ADJUSTMENT

- **Connection Diagram**

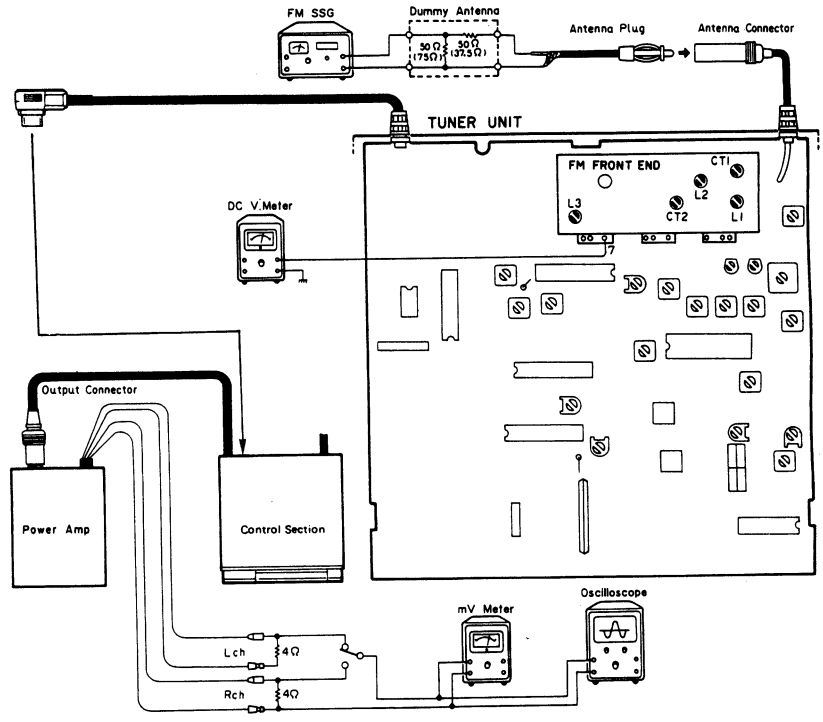


Fig. 41

- **To Adjust**

Frequency of FM SSG	Displayed Frequency	Adjusting Point	DC V Meter	mV Meter
1.	107.9 MHz	L3	7.6 ± 0.3V	
2.	88.1 MHz	For confirmation Only	2.2 ± 0.5V	
3. 90 MHz (400 Hz, 100% modulation) output level 10 dB (μV)	90 MHz	L1, L2		Maximum output
4. 106 MHz (400 Hz, 100% modulation) output level 10 dB (μV)	106 MHz	CT1, CT2		Maximum output
5. Repeat items (3) and (4) alternately so that the mV meter indicates maximum output.				

6.5 AM TRACKING ADJUSTMENT

NOTICE:
Select C1 so that total capacity of 80pF is attained from the direction of the receiver jack.
Z: Output impedance of SSG.

• Connection Diagram

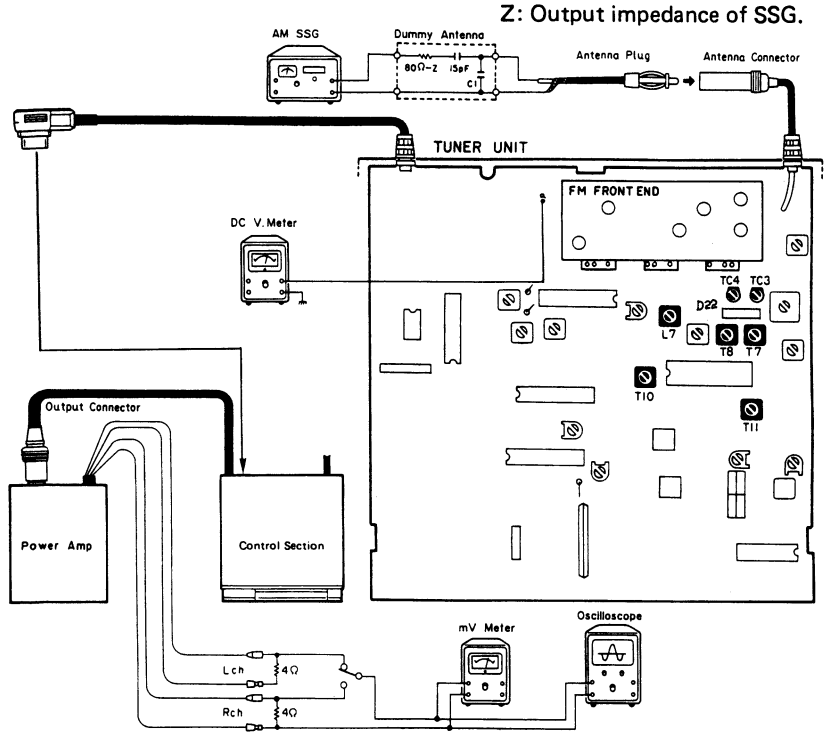


Fig. 42

• To Adjust

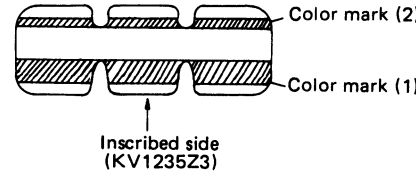
When adjusting the 522kHz tuning voltage note that the tuning voltage differs according to the D22 (KV1235Z3) color mark.

SSG frequency	Display frequency display	Adjustment location	D22 rank	D22 color	Tuning voltage DC voltmeter	Millivoltmeter
1.	520kHz	L7	1	Blue	0.9 ± 0.05V	
			2	Red	0.9 ± 0.05V	
			3	No mark	1.0 ± 0.05V	
			4	White	1.1 ± 0.05V	
			5	Green	1.2 ± 0.05V	
2.	1,620kHz	Check only	Less than 8.3V			
3. 600kHz (400Hz, 30% modulation) Ouput 15dB (μV)	600kHz	T7, T8				Maximum output
4. 1,400kHz (400Hz, 30% modulation) Output 15dB (μV)	1,400kHz	TC3, TC4				Maximum output
5. Repeat frequencies specified in steps 3 and 4 alternately, and adjust to obtain maximum output.						
6. 1,000kHz (400Hz, 30% modulation) Output 15dB (μV)	1,000kHz	T10, T11				Maximum output

When D22 is replaced, use a variable capacitance diode of the same color markings (that is, same rank).

Rank	Color mark (1)	Color mark (2)
1	White	Blue
2	White	Red
3	White	No mark
4	White	White
5	White	Green

Top view



6.6 FREQUENCY RESPONSE CONTROL ADJUSTMENT

- **Connection Diagram**

NOTICE:
Select C1 so that total capacity of 80pF is attained from the direction of the receiver jack.
Z: Output impedance of SSG.

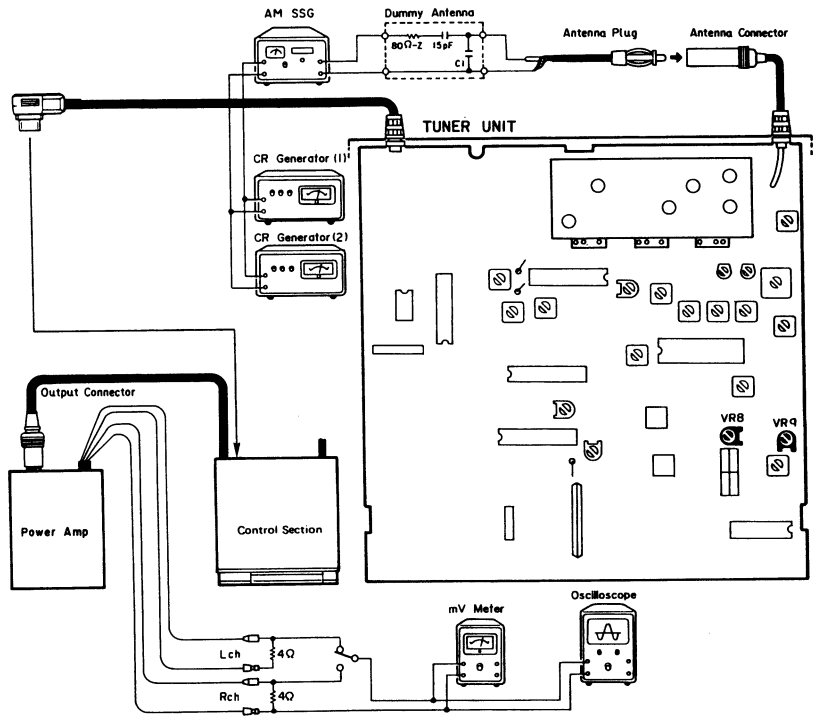


Fig. 43

- **To Adjust**

1. Set the WIDE switch to the WIDE position.
2. Apply a 1,400kHz 400Hz 30% modulation, 50dB (μV) signal from the SSG, and tune the tuner to 1,400kHz.
3. Change the SSG modulation frequency to 5kHz 30% modulation, and adjust VR9 to obtain a level −8dB below the 400Hz output level.

Note:
1. Adjust to 10kHz, 20% modulation by the CR generator (1) level adjustment VR (with the CR generator (2) level set to minimum value).
2. Then check the position of the CR generator (1) level adjustment VR.
3. Next switch CR generator (1) to minimum level.
4. Adjust to 6kHz, 10% modulation by the CR generator (2) level adjustment VR.
5. Readjust the CR generator (1) level adjustment VR to the level checked in step 2 above.

6.7 WIDE SWITCHING SENSITIVITY ADJUSTMENT

- **Connection Diagram**

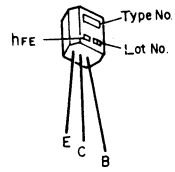
(Shown in Fig. 43)

- **To Adjust**

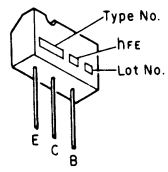
1. Set the WIDE switch to the WIDE position.
2. Together with a 45dB (μV) signal obtained by simultaneous modulation of 10kHz at 20% modulation and 6kHz at 10% modulation (Note), apply a 1,400kHz (carrier) signal from the SSG, and tune the tuner to 1,400kHz. (Leave VR8 turned fully clockwise during this step).
3. Adjust VR8 to obtain a sharp drop in the 6kHz waveform. (Turn the adjustment VR slowly during this step. If turned too quickly, the VR must be turned back fully clockwise, and the adjustment repeated.)
4. Check that WIDE is switched to NARROW at 45 ± 6dB (μV).
5. Check that NARROW is switched to WIDE at 37 ± 6dB (μV).

• ICs and Transistors

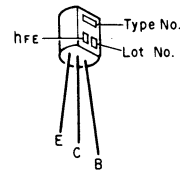
2SA933S
2SC1740S
2SC2458
2SC3113



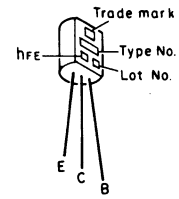
2SD1055F



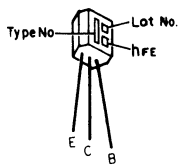
2SA934
2SC2060
2SC1645



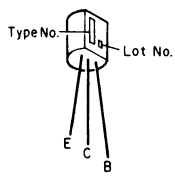
2SA838
2SC2634NC



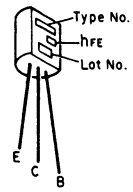
2SA608SP
2SD1012



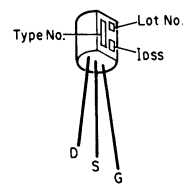
2SA1005



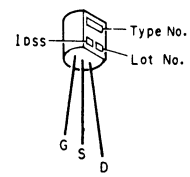
2SB562
2SD468



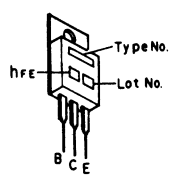
2SK163



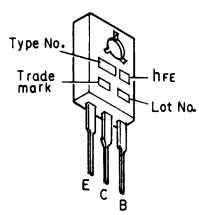
P003



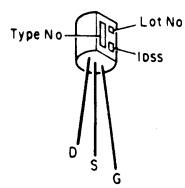
2SB941



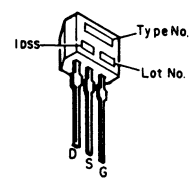
2SB772



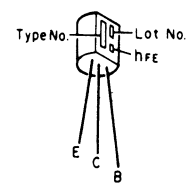
2SK49-H2



2SK241

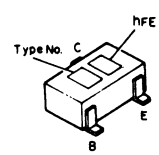


2SA608NP

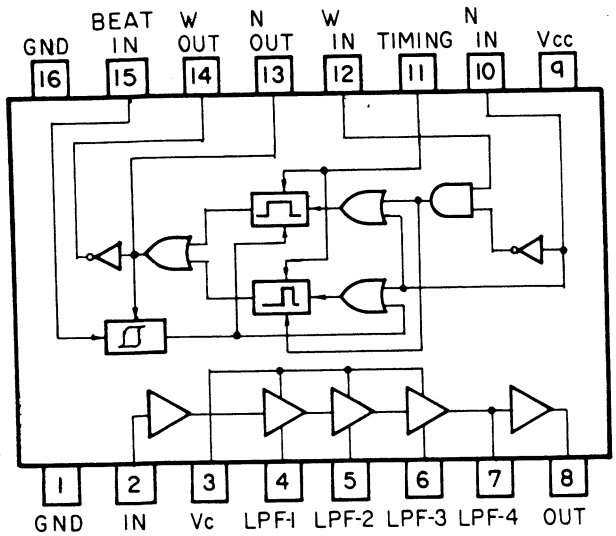


CHIP TRANSISTORS

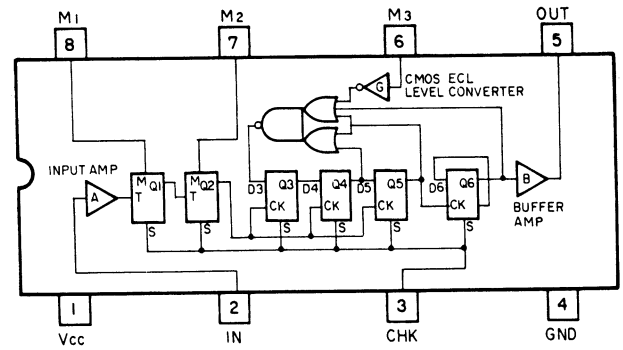
Part No.	Indication (Type No., hFE)
2SA1179-M5	M5
2SA1179-M6	M6
2SA1179-M7	M7
2SB709-AQ	AQ
2SB709-AR	AR
2SB709-AS	AS
2SC2712-LG	LG
2SC2712-LL	LL
2SC2712-LY	LY
2SD601-YQ	YQ
2SD601-YR	YR
2SD601-YS	YS



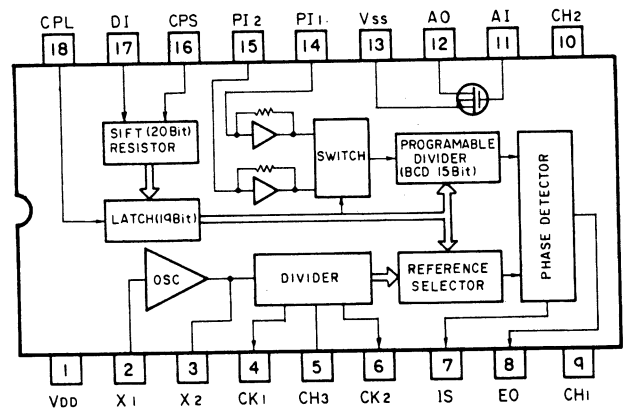
PA0007



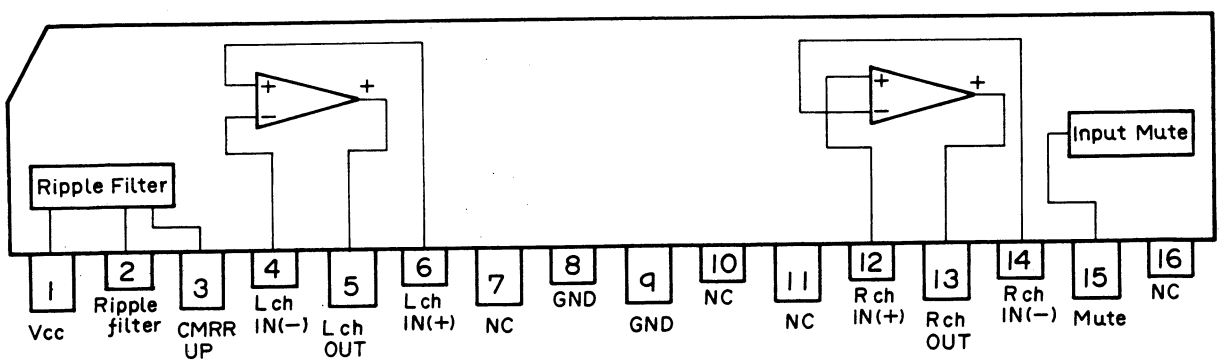
μPB554C



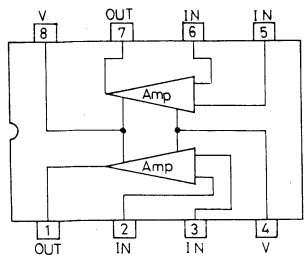
μPD2819C



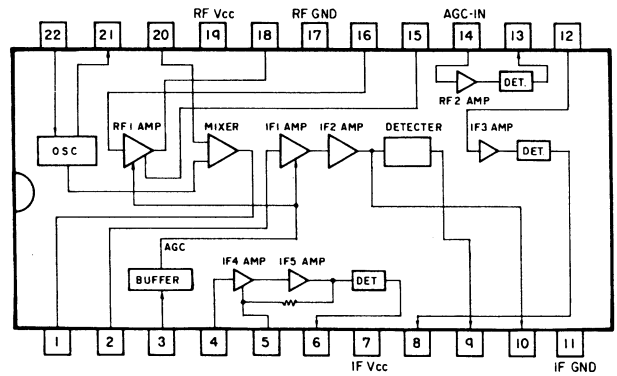
PA2014



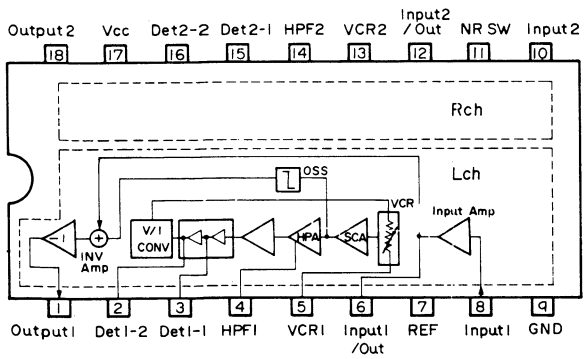
TA75558P



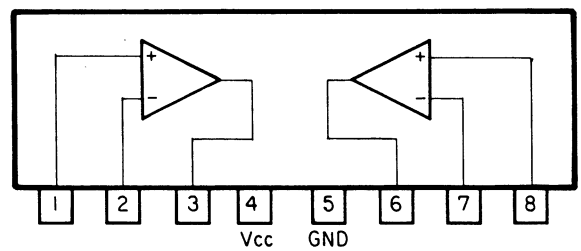
PA3016



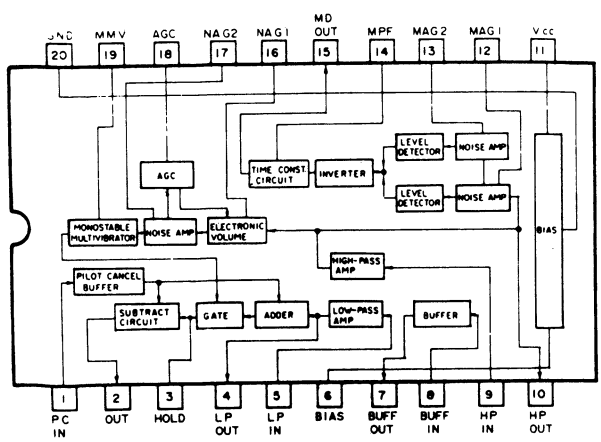
HA12047



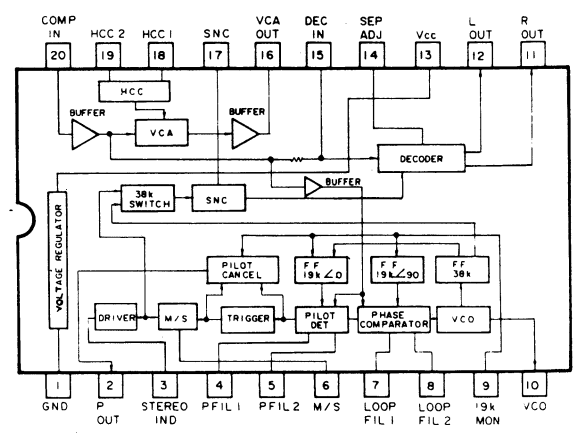
MB3106M



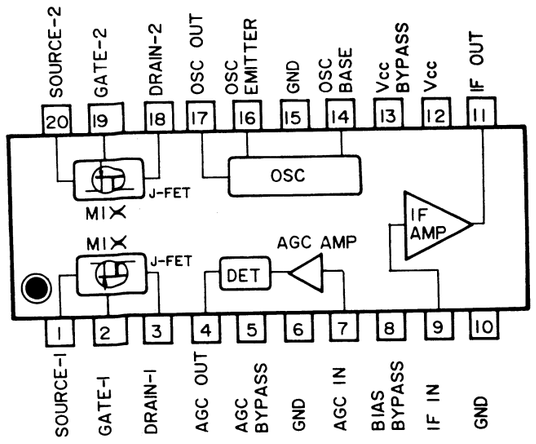
PA0014



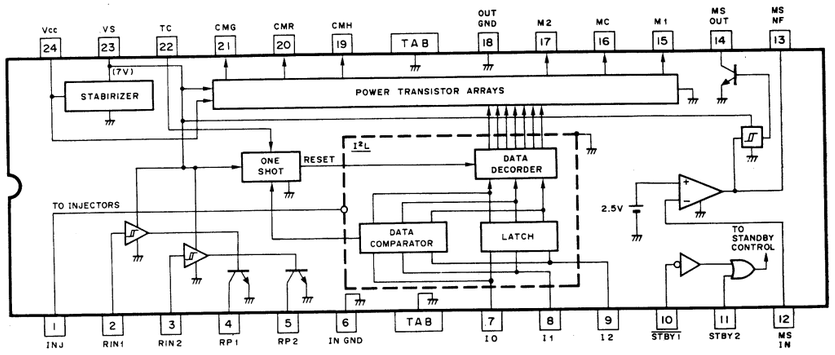
PA0015



PA4009



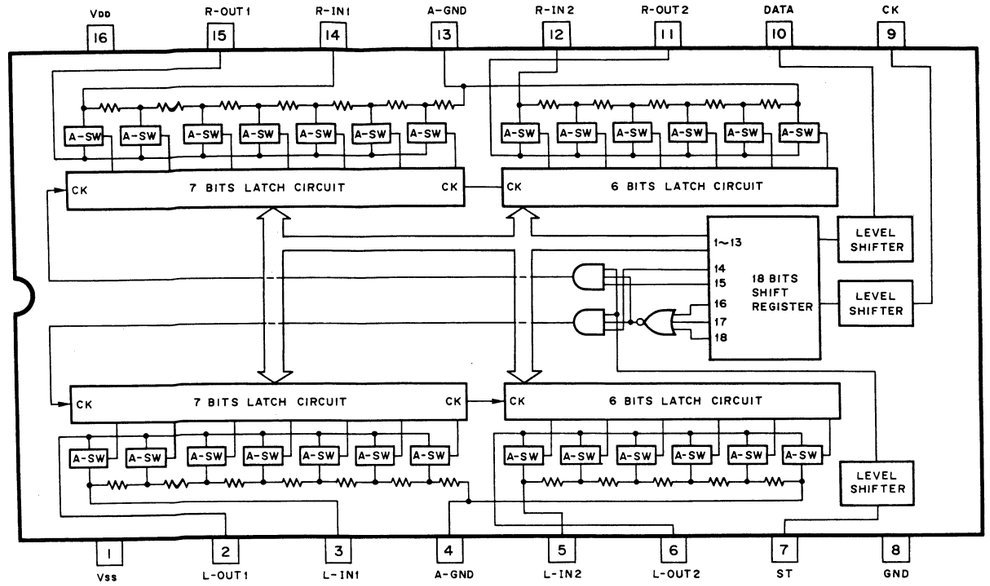
PA3019



• Pin Function (PA 3019)

Pin No.	Pin Name	I/O	Function and Operation
1	INJ	Input	"Internal logic" (I^2L) power source
2	RIN1	Input	Input pin for reel unit rotation sensor (MR 1)
3	RIN2	Input	Input pin for reel unit rotation sensor (MR 2)
4	RP1	Output	Output for wave form signal from reel sensor input 1 (pin 2)
5	RP2	Output	Output for wave form signal from reel sensor input 2 (pin 3)
6	IN GND	–	Low signal system ground pin
7	I0	Input	Motor control logic input pin
8	I1	Input	
9	I2	Input	
10	$\overline{\text{STBY1}}$	Input	Standby control—switches IC power circuit off at active low (0.7V or less).
11	STBY2	Input	Standby control—switches IC power circuit off at active high (3.5V or more).
12	MSIN	Input	Input (inverted) pin for MS amp.
13	MSNF	Output/ Input	MS amp. output and MS Schmitt circuit input
14	MSOUT	Output	MS Schmitt circuit output—when signal level at MSNF pin exceeds 0 dBm, pulse is outputted open when below 0 dBm
15	M1	Output	Drive output "+" pin for head drive motor M1
16	MC	Output	Drive output common pin for motors M1 and M2
17	M2	Output	Drive output "+" pin for drive motor M2 ("FF/REW" switching gear)
18	OUT GND	–	Motor drive circuit ground pin
19	CMH	Output	Drive output H (+) pin for capstan motor M3 output voltage: During speed control: app. Vcc–1.7V During loading and eject: 6.9V
20	CMR	Output	Drive output R pin for capstan motor M3 During speed control: open During loading: app. 0V During eject: app. 7V
21	CMG	Output	Drive output GND (–) pin for capstan motor M3 During speed control: app. 0V During loading and eject: open
22	TC	Output	Pin for capacitor for setting timer to switch power transistor off in a set time when logic inputs I0, I1, I2 change.
23	VS	Output	Power source for reel rotation sensor—app. 7V
24	Vcc	Input	IC power supply pin

TC 9154P

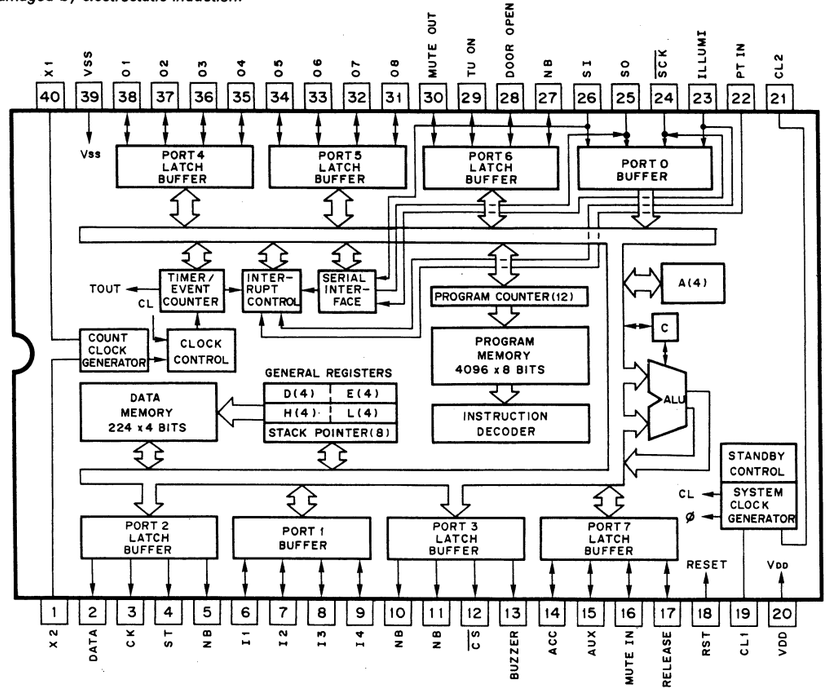


• Pin Function (TC9154P)

Pin No.	Pin Name	I/O	Function and Operation
1	Vss	—	(−) power source pin
2	L-OUT1	Output	10 dB step attenuation output
15	R-OUT1	Output	Signal received at IN, reduced from 0 dB to −60 dB in 7 10-dB steps
3	L-IN1	Input	10 dB step attenuation input
14	R-IN1	Input	
4	A-GND	—	AC ground
13	A-GND	—	
5	L-IN2	Input	2 dB step attenuation input
12	R-IN2	Input	
6	L-OUT2	Output	2 dB step attenuation output
11	R-OUT2	Output	Signal received at IN reduced from 0 dB to −8 dB in 5 steps of 2 dB
7	ST	Input	Strobe input pin—attenuation & channel selection signals received from the DATA and CK terminals are latched by going "H" level at this pin—if "H" level not reached at this pin, prior data is used.
8	GND	—	
9	CK	Input	Input pin for clock used when receiving data from the DATA pin
10	DATA	Input	Attenuation and channel selection data input pin—inputted as 18 bit CK signal.
16	VDD	—	(+) power source pin

*IC's marker by *are MOS type.*
Be careful in handling them because they are very liable to be damaged by electrostatic induction.

*PD4055A

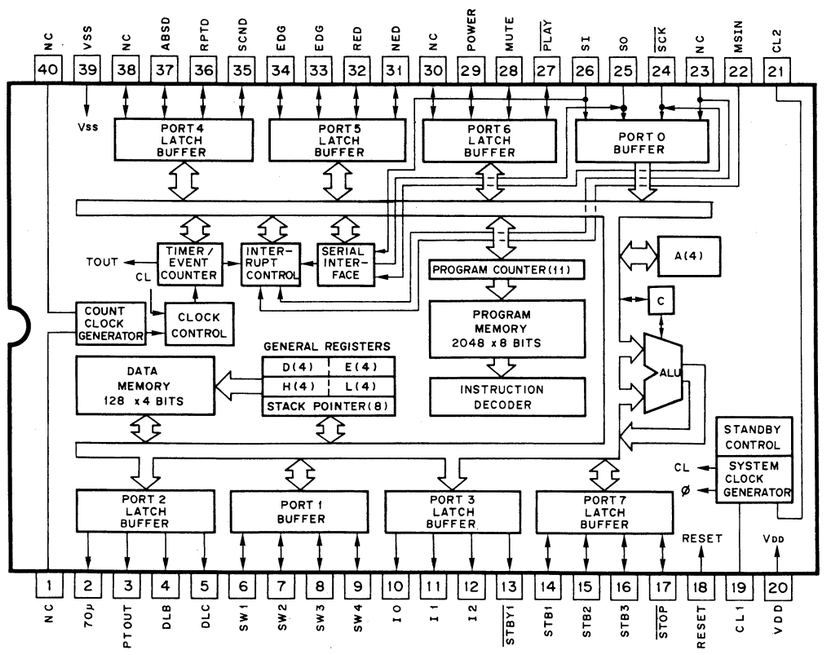


• Pin Function (PD4055A)

Pin No.	Pin Name	I/O	Function and Operation
1	X2	Output	Pin for counter clock oscillator crystal
2	DATA	Output	Pin for driving electronic volume control IC and TC 9154P when transmitting serially
3	CK	Output	
4	ST	Output	
5	NB	Output	Open
6–9	I1–I4	Input	Keyboard switch matrix input
10, 11	NB	Output	Open
12	$\overline{CS}$	Output	Activates display controller IC
13	BUZZER	Output	Outputs 3.8 kHz when control buttons are switched on or off, etc.
14	ACC	Input	Connects to automobile Acc. power source—"H" at app. 5V or more.
15	AUX	Input	"H" when device connected to AUX pin is "on"
16	MUTE IN	Input	When "H", attenuation of serial transmission of electronic volume is maximized.
17	RELEASE	Input	When "H", release command is sent to deck controller—FEX-55 is GND
18	RST	Input	Reset to start when back up power source is "on" or reset button pushed
19	CL1	Input	Pin for system clock oscillator crystal—external clock input
20	VDD	—	Power source pin
21	CL2	Output	Pins for the capacitor and resistor for the system clock oscillator.
22	PT IN	Input	Input pin for deck controller pulse (100 Hz, DUTY 50% output)
23	ILLUMI	Input	Connected to "small-lamp-linked" power source

Pin No.	Pin Name	I/O	Function and Operation
24	$\overline{SCK}$	Input/ Output	Pin for synchronized clock for serial transmission among the deck, tuner and display controllers
25	SO	Output	Data output pin for serial transmission among the deck, tuner and display controllers
26	SI	Input	Data input pin for serial transmission between the deck and tuner controllers
27	NB	Output	Not used at present
28	DOOR OPEN	Output	Not used at present
29	TU ON	Output	"H" when tuner is "on"
30	MUTE OUT	Output	Not used at present
31–38	O1–O8	Output	Keyboard switch matrix output
39	Vss	—	Power source GND
40	X1	Input	Pin for counter clock oscillator crystal—external clock input

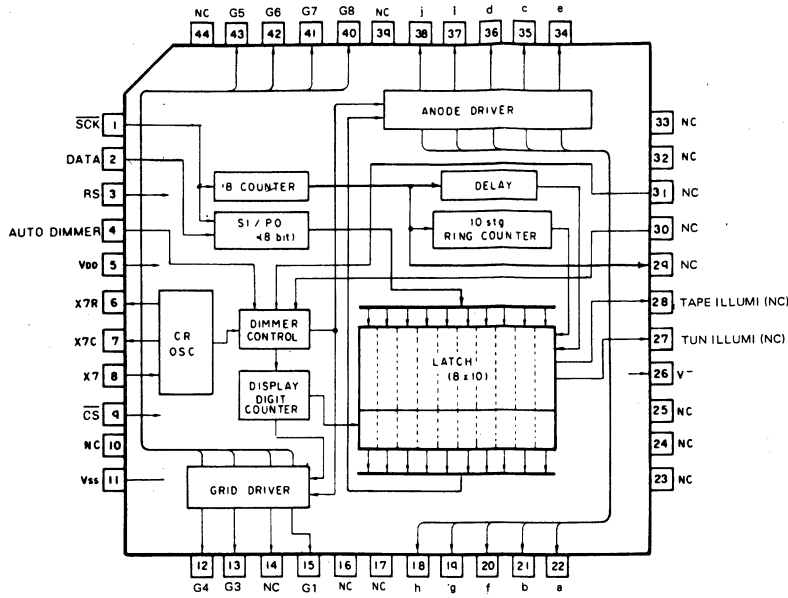
*PD 4056A



• Pin Function (PD4056A)

Pin No.	Pin Name	I/O	Function and Operation
1	NC	Output	Open
2	70μs	Output	Pin for switching the 70 μs equalizer. Active "H."
3	PT OUT	Output	100 Hz Duty 50% pulse output pin. This signal is output during reset operation and while Acc is not off.
4	DLB	Output	Dolby B switching output pin. Dolby B at "H" level.
5	DLC	Output	Not used at present.
6–9	SW1–SW4	Input	Mechanism control switch matrix input pin
10–12	I0–I2	Output	Motor drive IC (PA3019) control signal output pin
13	$\overline{STBY1}$	Output	• I0, I1, I2: control code output • $\overline{STBY1}$: PA3019 output "off." Active "L."
14–16	STB1–STB3	Output	Mechanism control switch matrix strobe output pin. Active "H" STB1: head position sensor STB2: FF/REW gear position sensor STB3: Loading and 70 μs sensor
17	$\overline{STOP}$	Output	Pin for stopping capstan motor. Is "L" when entering the "play" or "release" mode from FF/REW. Active "L."
18	RESET	Input	Reset input pin—active "H."
19	CL1	Input	Pin for system clock oscillator circuit. Used to connect a capacitor and a resistor.
20	VDD	—	Power source pin
21	CL2	Output	Pin for system clock oscillator circuit. Used to connect a capacitor and a resistor.
22	MS IN	Input	Music detection signal input pin for MS: No music—"L" level input; Music—pulse input.
23	NC	—	Fixed at GND level
24	$\overline{SCK}$	Input/ Output	Input/output pin for shift clock For serial interface
25	SO	Output	Serial interface data output pin
26	SI	Input	Serial interface data input pin
27	$\overline{PLAY}$	Output	MS amp. filter switching output pin. "L" level when in "play."
28	MUTE	Output	Mute signal output pin. Active "H."
29	POWER	Output	Output pin for power source control. "H" level when deck is "on."
30	NC	—	Fixed at GND level
31	NED	Input	Forward side reel rotation pulse input pin. Monitors tape end.
32	RED	Input	Reverse side reel rotation pulse input pin. Monitors tape end.
33, 34	EDG	Input	Fixed at GND level
35	SCND	Input	Mode set input pin
36	RPTD	Input	• SCND: SCAN function cancelled at "H" level.
37	ABSD	Input	• RPTD: repeat function cancelled at "H" level.
38	NC	Input	• ABSD: ABS function at "H" level. • NC: fixed at level VDD.
39	Vss	—	
40	NC	—	Fixed at GND level

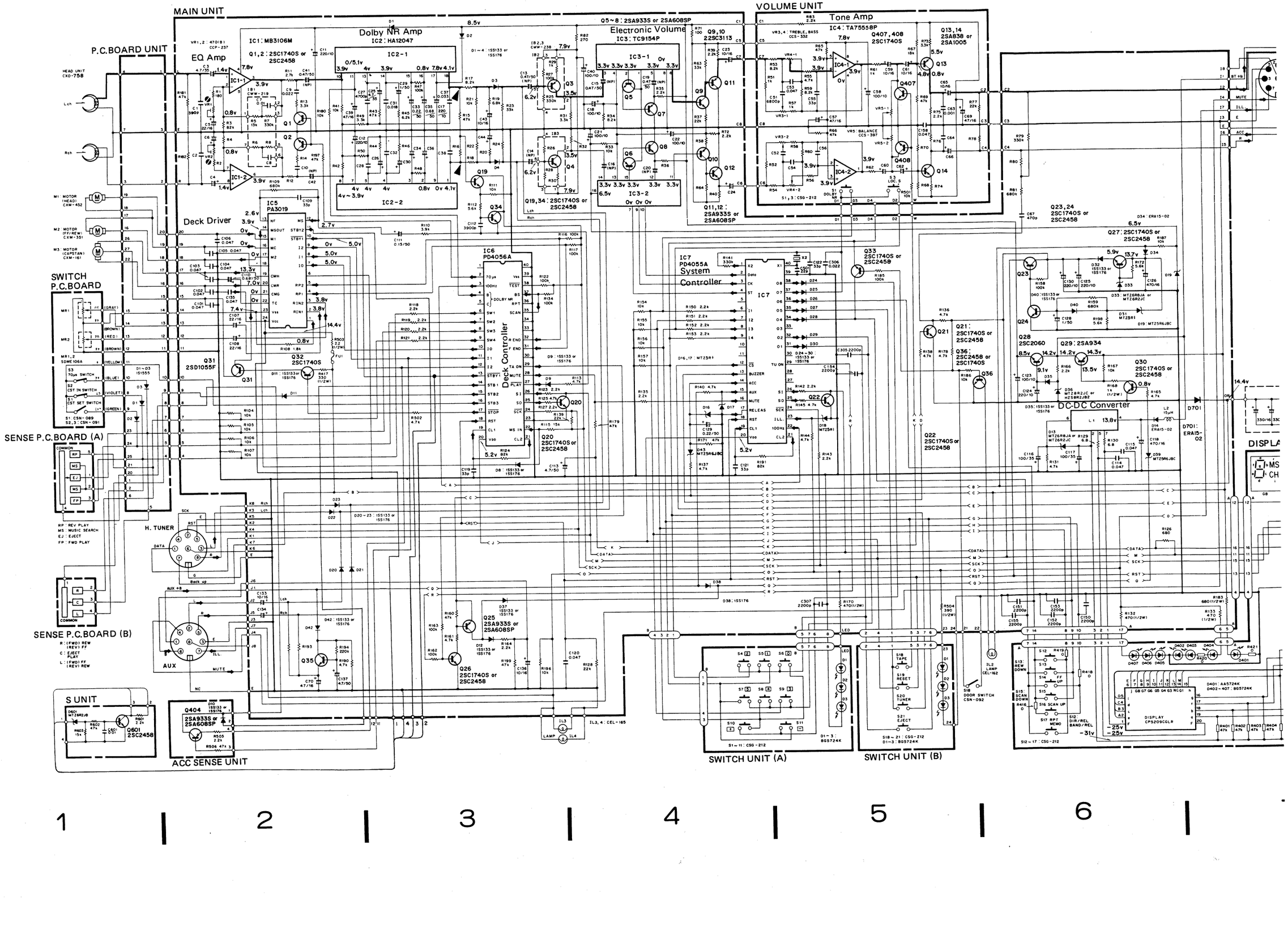
*PD 7005



Pin Functions (PD7005)

Pin No.	Pin Name	I/O	Function and Operation
1	$\overline{SCK}$	Input	Serial interface system clock input pin. Active "L".
2	DATA	Input	Data input pin
3	RS		Reset pin
4	AUTO DIMMER		Not used
5	VDD		Power supply pin. 5V ± 0.3V
6 ~ 8			For oscillator circuit
9	$\overline{CS}$	Input	Chip selector signal input pin. Active "L".
10	NC		
11	Vss		GND
12~15	G4~G1	Output	FL grid outputs (14 pin is NC)
16、17	NC		
18~22	h, g, f, b, a	Output	FL anode outputs
23~25	NC		
26	V−	Output	Grid output. Negative voltage Output pin for pull-down resistor.
27	TUN ILLUMI.	Output	TUN illuminator ON output pin ("H" level). Not used
28	TAPE ILLUMI.	Output	TAPE illuminator ON output pin ("H" level). Not used
29~31	NC		Not used
32、33	NC		
34~36	e, c, d	Output	FL anode outputs
37、38	i, j	Output	
39	NC		
40~43	G8~G5	Output	FL grid outputs
44	NC		

7. SCHEMATIC CIRCUIT DIAGRAM (CONTROL SECTION)



Audio Control Unit (CWX-577)

Consists of
- Main Unit
- Volume Unit
- Acc Sense Unit

SWITCHES :

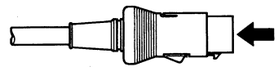
◎ SWITCH P.C.BOARD

S1 : CST SET SWITCH	.....	ON–OFF
S2 : CST IN SWITCH	.....	ON–OFF
S3 : 70μs SWITCH	.....	IN (120μs)–OFF (70μs)

◎ MISCELLANEOUS

S18 : DOOR SWITCH	.....	ON (CLOSE)–OFF (OPEN)

The underlined indicated the switch position.



The view of the connector is one seen from the mating connector.

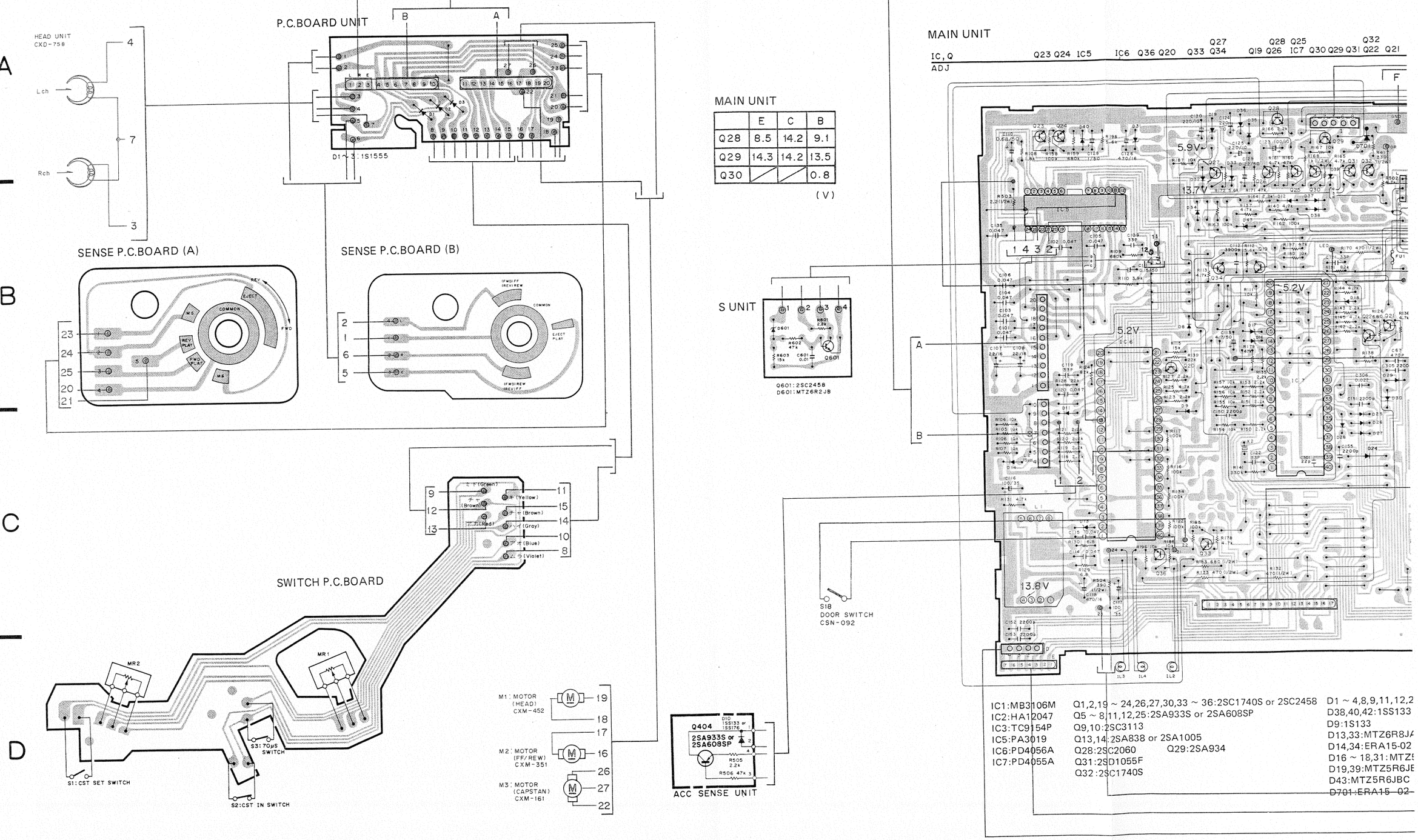
NOTE :

Indicates a chip resistor

Indicates a chip capacitor

Fig. 44

8. CONNECTION DIAGRAM (CONTROL SECTION)



MAIN UNIT	E	C	B
Q28	8.5	14.2	9.1
Q29	14.3	14.2	13.5
Q30			0.8

(V)

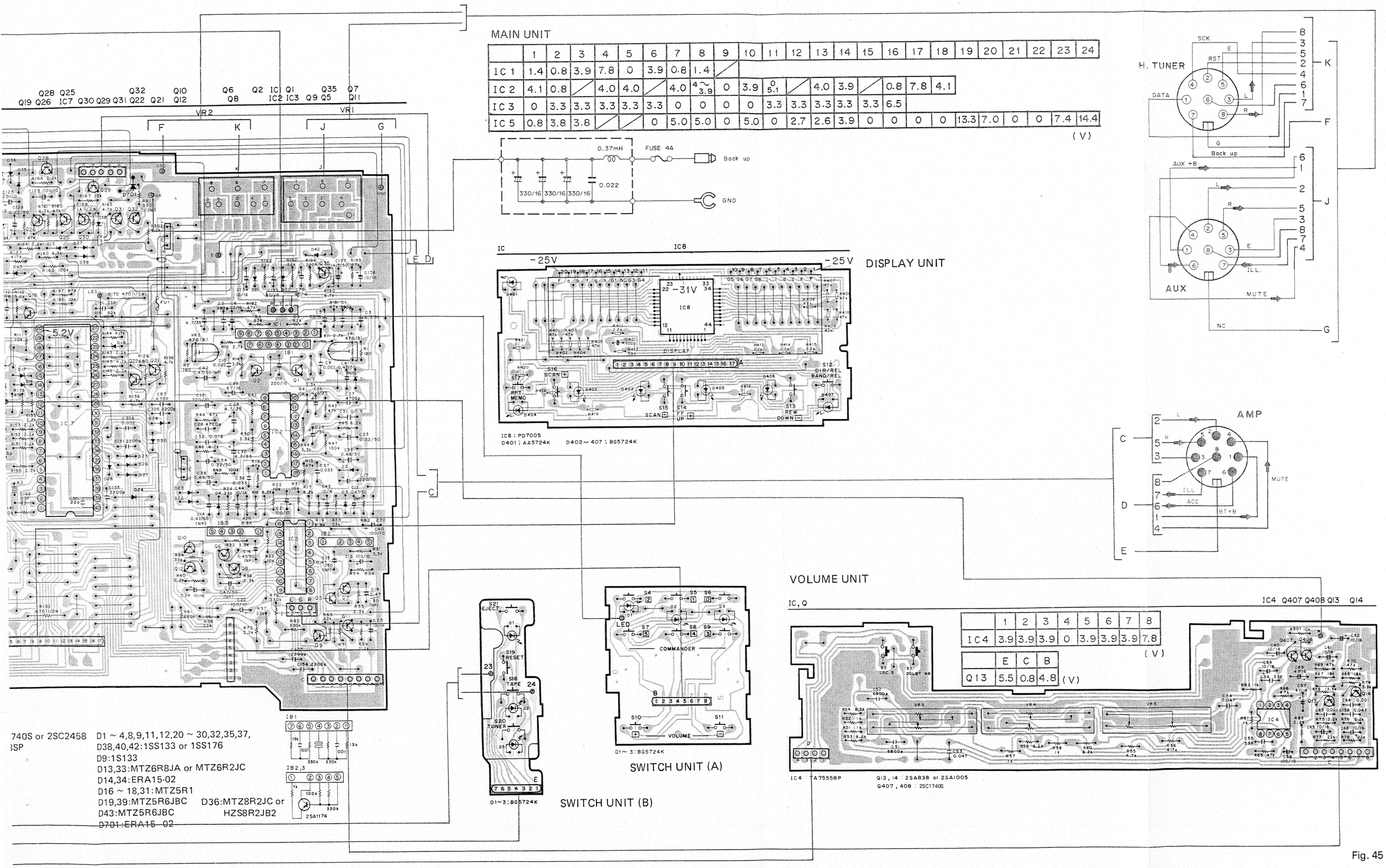
7 8 9 10 11 12

A B C D

MAIN UNIT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
IC 1	1.4	0.8	3.9	7.8	0	3.9	0.8	1.4																
IC 2	4.1	0.8		4.0	4.0		4.0	4~3.9	0	3.9	0~5.1		4.0	3.9		0.8	7.8	4.1						
IC 3	0	3.3	3.3	3.3	3.3	3.3	0	0	0	0	3.3	3.3	3.3	3.3	3.3	6.5								
IC 5	0.8	3.8	3.8			0	5.0	5.0	0	5.0	0	2.7	2.6	3.9	0	0	0	0	13.3	7.0	0	0	7.4	14.4

(V)



VOLUME UNIT

IC, Q

IC4 Q407 Q408 Q13 Q14

	1	2	3	4	5	6	7	8
IC4	3.9	3.9	3.9	0	3.9	3.9	3.9	7.8

(V)

	E	C	B
Q13	5.5	0.8	4.8

(V)

IC4 : TA75558P
Q13, 14 : 2SA838 or 2SA1005
Q407, 408 : 2SC1740S

740S or 2SC2458
SP

D1 ~ 4,8,9,11,12,20 ~ 30,32,35,37,
D38,40,42:1SS133 or 1SS176
D9:1S133
D13,33:MTZ6R8JA or MTZ6R2JC
D14,34:ERA15-02
D16 ~ 18,31:MTZ5R1
D19,39:MTZ5R6JBC D36:MTZ8R2JC or
D43:MTZ5R6JBC HZS8R2JB2
~~D701:ERA15-02~~

Fig. 45

9. SCHEMATIC CIRCUIT DIAGRAM (TUNER SECTION)

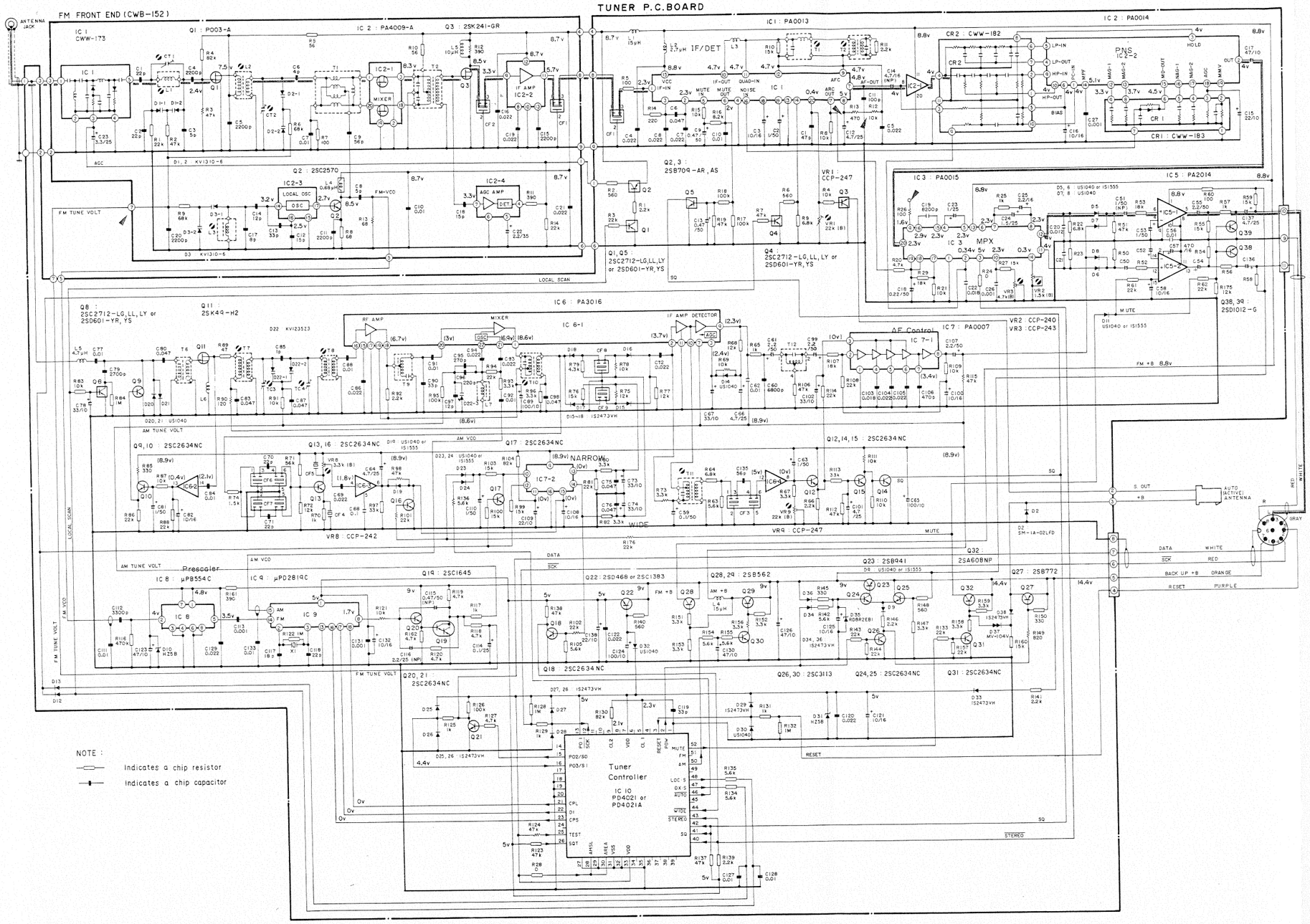


Fig. 46

10. CONN

IC5

1	8~11
8.8V	0V

IC6

1	2	7	8	9
(8.6V)	(3.7V)	(8.9V)	0V	(2.3V
12	17	18	19	20
(5V)	0V	(6.7V)	(8.6V)	(3V

IC7

1	3	7	9	11
0V	(0V)	(3.4V)	(8.9V)	(0V

Q1, 4, 5, 8, 9, 14~18, Q21, 26, 31, 38, 39

E	0V

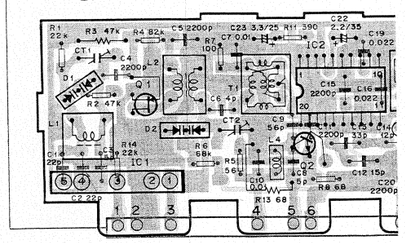
	Q2	Q3	Q12	Q2
C		0V	(8.9V)	9V
E	8.7V			

	Q23	Q25	Q27	Q2
C	9V	14.4V		
E	14.4V		14.4V	9V

FM FRONT END (CWB-152)

IC, Q IC1 Q1 Q2 IC2

ADJ. CT1 L1 L2 CT2



IC1 : CWW-173
IC2 : PA4009-A
Q1 : P003
Q2 : 2SC2570
Q3 : 2SK241-GR
D1~3 : KV1310-6

Q2

B	2.7V
C	8.5V

IC2

2	3	6	7
0V	8.3V	0V	3.3V
12	14	15	16
8.7V	3.2V	0V	2.5

10. CONNECTION DIAGRAM (TUNER SECTION)

TUNER P.C. BOARD

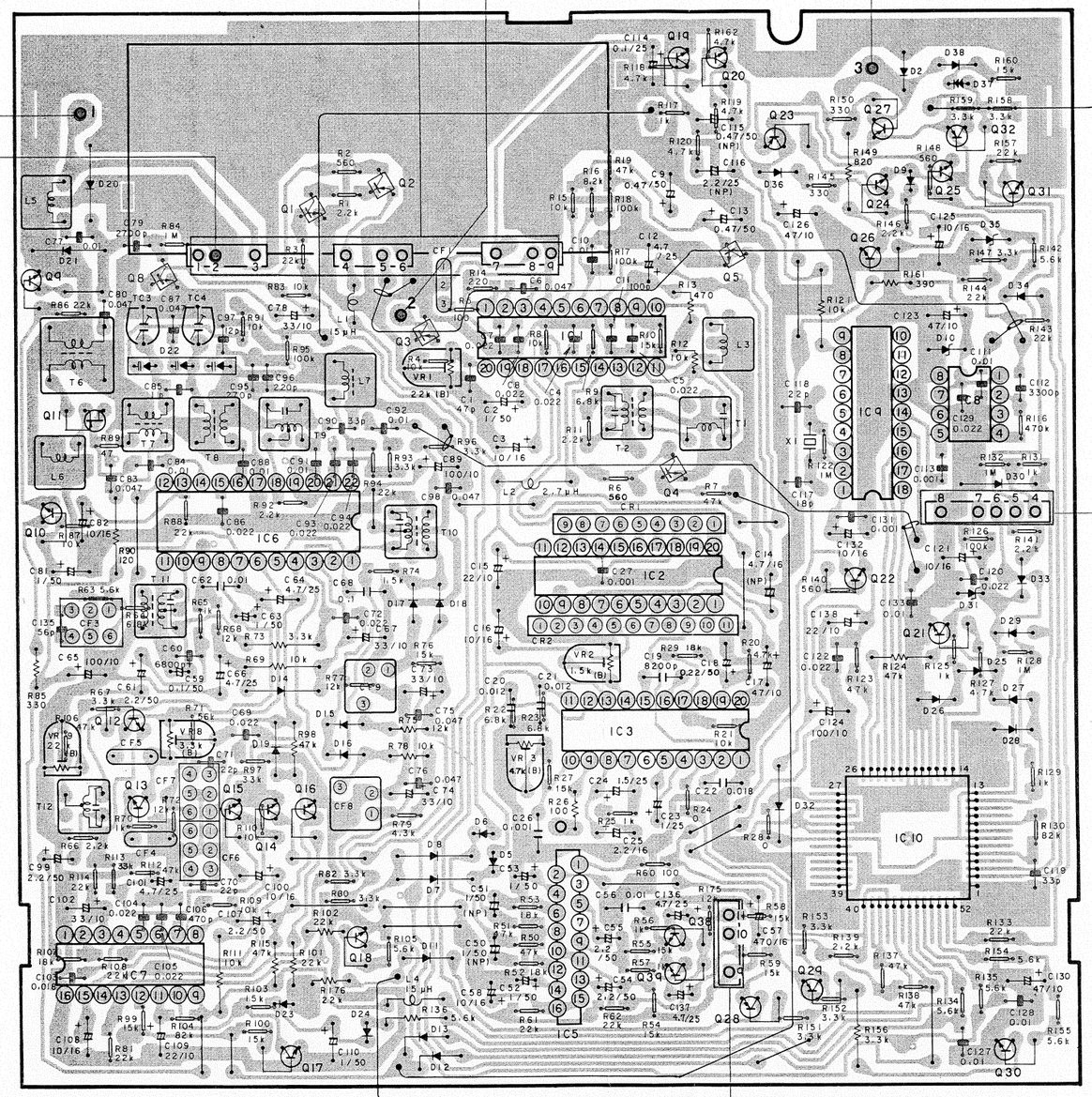
ANTENNA JACK

Q8
Q10 Q12 Q13 Q1 Q2 Q3
IC, Q Q9 Q11 IC7 IC6 Q15 Q14 Q17 Q16 Q18
VR9 TC3 TC4
ADJ T7 T11 VR8 T8 L7 T10 VR1

Q4 Q39 Q5
Q19 Q20
IC1 IC5 IC2 IC3 Q38 Q28 Q23 Q29
Q26 Q24 Q27
Q22 IC10 Q32 IC8
IC9 Q25 Q21 Q30 Q31
VR3 VR2 T2 T1

S OUT
+B

AUTO (ACTIVE) ANTENNA



IC5

1	8~11
8.8V	0V

IC6

1	2	7	8	9	11
(8.6V)	(3.7V)	(8.9V)	0V	(2.3V)	0V
12	17	18	19	20	21
(5V)	0V	(6.7V)	(8.6V)	(3V)	(6.9V)

IC7

1	3	7	9	11	13	15	16
0V	(0V)	(3.4V)	(8.9V)	(0V)	(0V)	(0V)	(0V)

Q1, 4, 5, 8, 9, 14~18, Q21, 26, 31, 38, 39

E	0V

	Q2	Q3	Q12	Q20	Q22
C		0V	(8.9V)	9V	9V
E	8.7V				5V

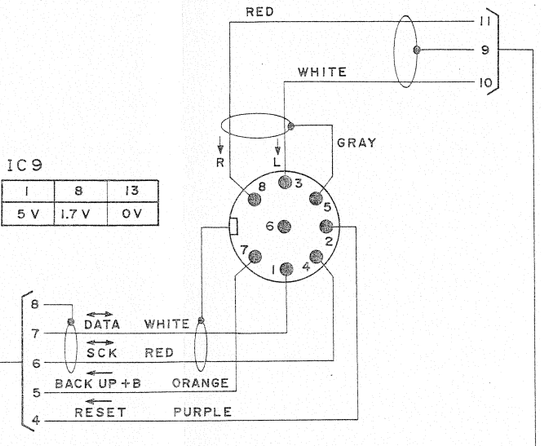
	Q23	Q25	Q27	Q28	Q29	Q32
C	9V	14.4V				
E	14.4V		14.4V	9V	9V	14.4V

IC1

1	2	3	4	5	6	7	8	9	10
2.3V	2.3V		0V		2V	4.8V	5V	4.7V	4.7V
11	12	13	14	15	16	17	18	19	20
4.7V	4.7V	0V		8.8V					0.4V

IC9

1	8	13
5V	1.7V	0V



IC8

1	2	3	4	5	6	7	8
4.8V	4V	0V	0V	3.5V	0V	4.8V	0V

IC2

1	2	3	4	5	6	7	8	9	10
4V	4V	4V			4V	4V	4V		4V
11	12	13	14	15	16	17	18	19	20
8.8V	3.3V	3.7V	5.1V	4.5V					0V

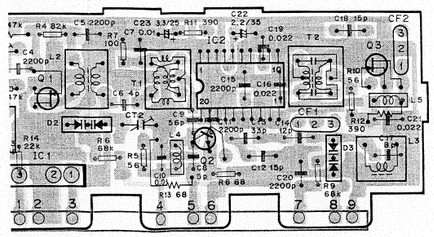
IC3

1	2	3	4	5	6	7	8	9	10
0V	0.34V	5V		2.3V		2.3V	2.3V	1.6V	2.3V
11	12	13	14	15	16	17	18	19	20
4V	4V	8.8V	0.3V	2.3V	2.9V				2.3V

IC10

1	5	7	9	13	16	17~23
0V	2.3V	5V	2.1V	5V	4.4V	0V
27	29	31	32	35		
0V	0V	0V	0V	0V		

FRONT END (CWB-152)



-173 Q1 : P003 D1~3 : KV1310-6
109-A Q2 : 2SC2570
Q3 : 2SK241-GR

IC2

2.7V						
8.5V						
2	3	6	7	9	10	11
0V	8.3V	0V	3.3V	3.3V	0V	5.7V
12	14	15	16	17	19	
8.7V	3.2V	0V	2.5V	2.7V	0V	

IC1 : PA0013 IC2 : PA0014 IC3 : PA0015 IC5 : PA2014 IC6 : PA3016 IC7 : PA0007 IC8 : μPB554C IC9 : μPD2819C
IC10 : PD4021 or PD4021A
Q1, 4, 5, 8 : 2SC2712-LG, LL, LY or 2SD601-YR, YS Q2, 3 : 2SB709-AR, AS Q9, 10, 12 ~ 18, 20, 21, 24, 25, 31 : 2SC2634NC
Q11 : 2SK49-H2 Q19 : 2SC1645 Q23 : 2SB941 Q26, 30 : 2SC3113 Q27 : 2SB772 Q28, 29 : 2SB562
Q32 : 2SA608NP Q38, 39 : 2SD1012-G Q22 : 2SD468 or 2SC1383
D2 : SM-1A-02LFD D5, 6, 9, 11~13, 19, 23, 24 : US1040 or IS1555 D7, 8, 14, 20, 21, 30, 32 : US1040 D10, 31 : HZ5B
D15~18, 25~29, 33, 34, 36, 38 : IS2473VH D22 : KV1235Z3 D35 : RD8R2EB1 D37 : MV-104V

Fig. 47

11. CHASSIS (1) EXPLODED VIEW (CONTROL SECTION)

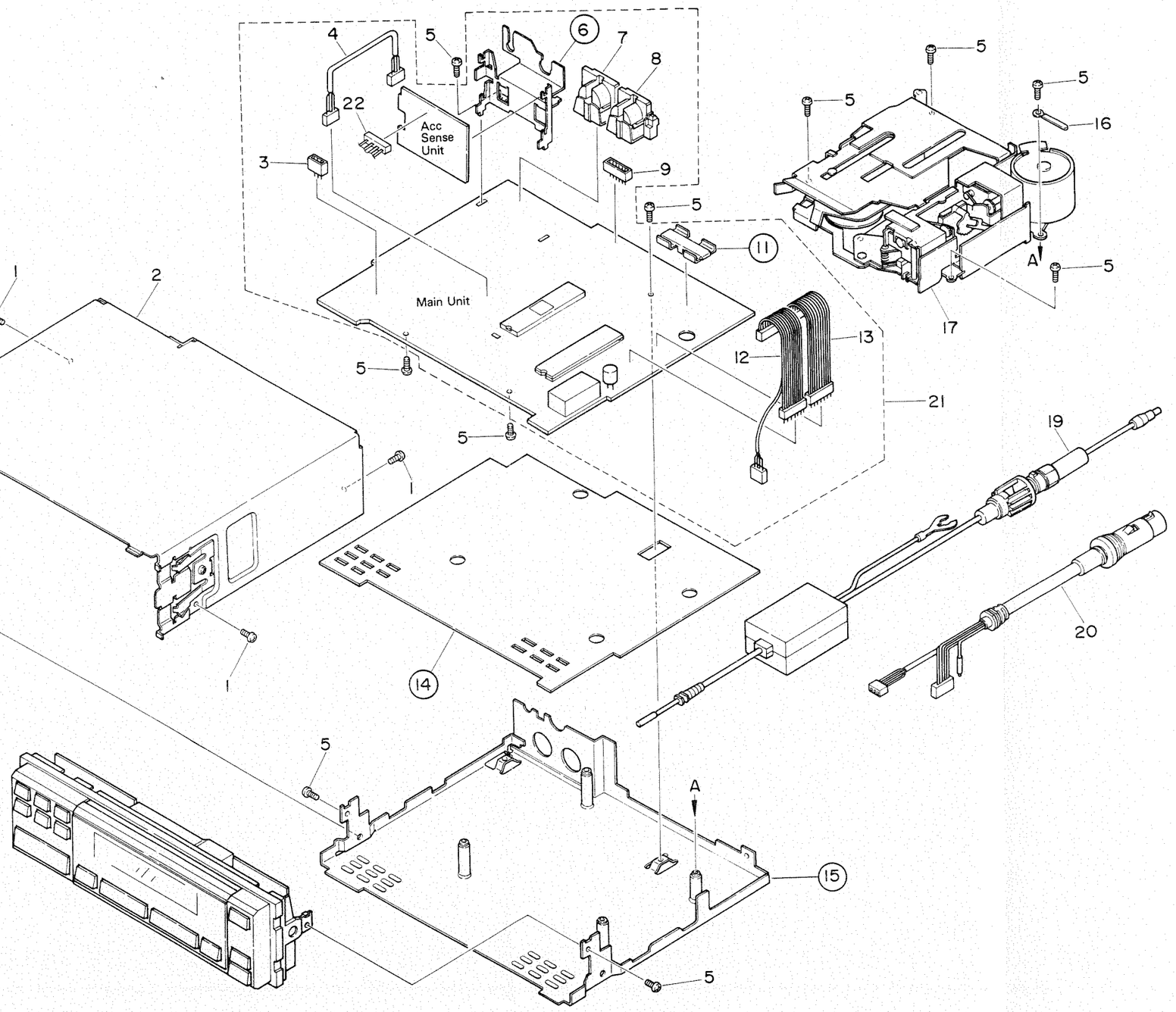


Fig. 48

11. CHASSIS (1) EXPLODED VIEW (CONTROL SECTION)

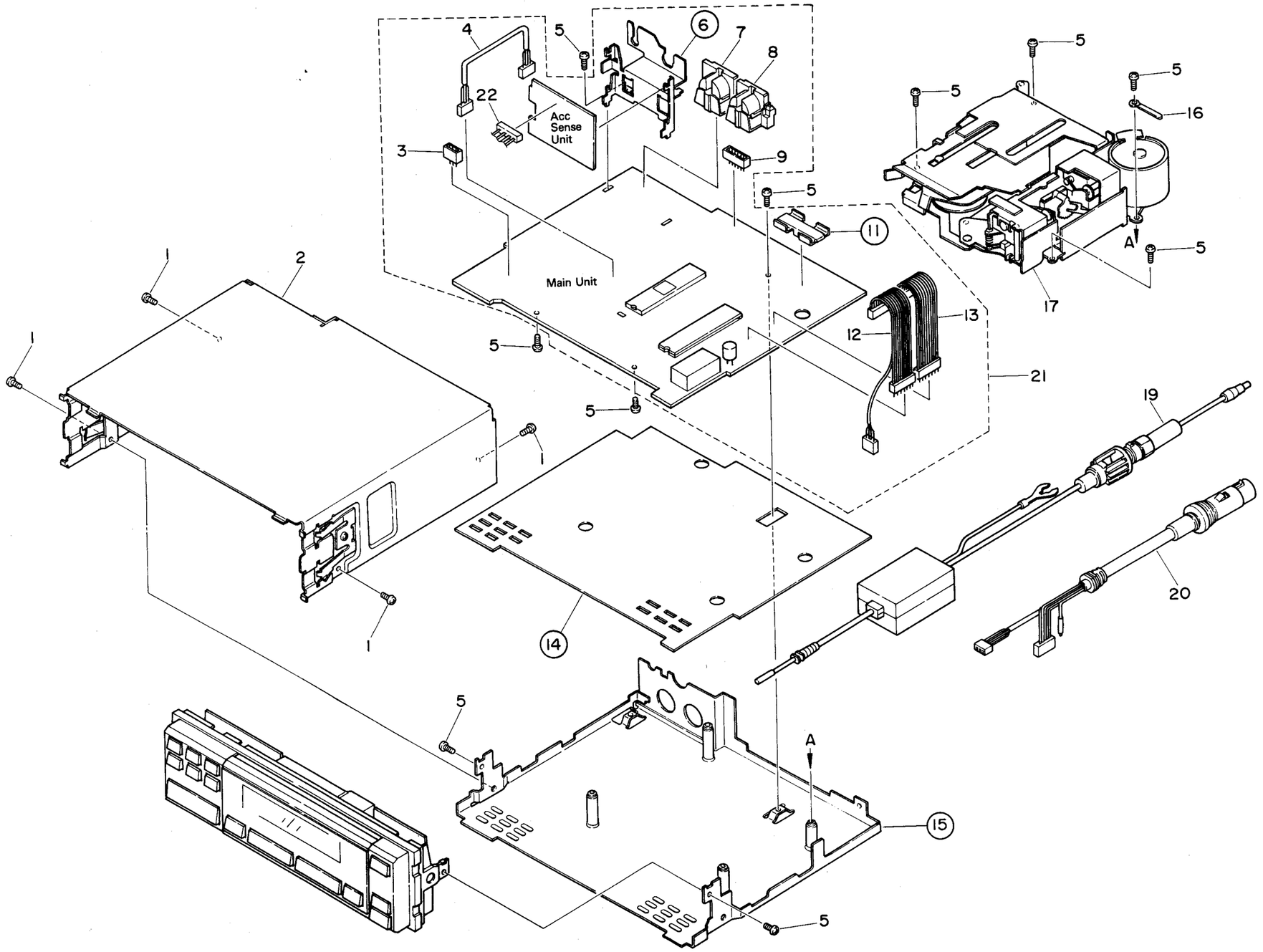


Fig. 48

• Chassis (1)

• Parts List

NOTE:

- *For your Parts Stock Control, the fast moving items are indicated with the marks ★ ★ and ★.*
  ★ ★: GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts whose parts numbers are omitted are subject to being not supplied.*

Mark	No.	Part No.	Description
	1.	CBA-121	Screw
	2.	CXD-441	Case Unit (/US, CA)
		CXD-560	Case Unit (/CS)
	3.	CKS-567	Plug
	4.	CDF-657	Connector
	5.	BMZ26P050FMC	Screw
	6.		Holder
	7.	CKS-549	Connector
	8.	CKS-550	Connector
	9.	CKS-569	Plug
	10.	VACANT	
	11.		Heat Sink
	12.	CDF-994	Connector
	13.	CDF-995	Connector
	14.		Insulator
	15.		Chassis Unit
	16.	CEF-007	Clamper
	17.	CXK-600	Cassette Mechanism Assy
	18.	VACANT	
	19.	CDK-099	Cord
	20.	CDK-112	DIN Connector Cord
	21.	CWX-577	Audio Control Unit (1/2)
	22.	CDK-281	Connector

12 CHASSIS (2) EXPLODED VIEW (CONTROL SECTION)

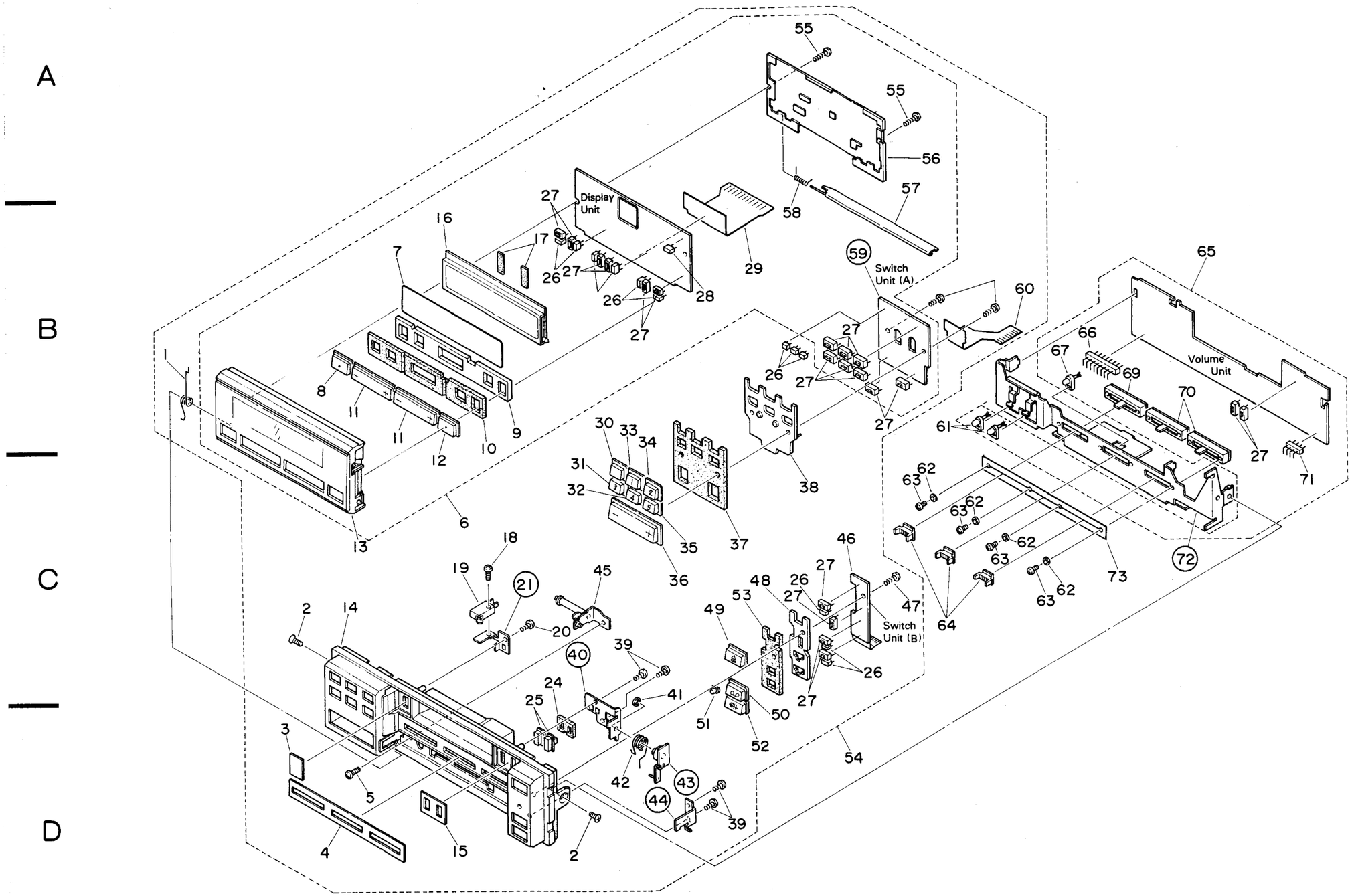


Fig. 49

• Chassis (2)

• Parts List

Mark	No.	Part No.	Description
	1.	CBH-792	Spring
	2.	CMZ30P050FMC	Screw
	3.	CNY-068	Plate (/US, CA)
		CNW-977	Plate (/CS)
	4.	CNW-976	Plate
	5.	BMZ26P040FMC	Screw
	6.	CWS-222	Display Unit (/US, CA)
		CWS-223	Display Unit (/CS)
	7.	CNN-369	Film
★	8.	CAC-826	Button (DIR, BAND/REL)
	9.	CNN-289	Spacer
	10.	CNN-170	Cushion
★	11.	CAC-825	Button
★	12.	CAC-827	Button (RPT, MEMO)
	13.	CXD-541	Grille Unit (/US, CA)
		CXD-540	Grille Unit (/CS)
	14.	CNK-275	Grille (US, CA)
		CNK-282	Grille (/CS)
	15.	CNY-069	Plate (/US, CA)
		CNW-980	Plate (/CS)
	16.	CP5209CGLR	FL Tube
	17.	CNN-341	Cushion
	18.	CBA-172	Screw
★★	19.	CSN-092	Switch
	20.	BPZ20P040FMC	Screw
	21.		Holder
	22, 23.	VACANT	
	24.	CNN-290	Cushion
★	25.	CAC-829	Button
★	26.	BG5724K	LED
★★	27.	CSG-212	Switch
★	28.	AA5724K	LED
	29.	CNL-622	P.C. Board
★	30.	CAC-772	Button (0)
★	31.	CAC-775	Button (3)
★	32.	CAC-776	Button (4)
★	33.	CAC-773	Button (1)
★	34.	CAC-774	Button (2)
★	35.	CAC-777	Button (5)
★	36.	CAC-824	Button (VOLUME)
	37.	CNN-168	Cushion
	38.	CNW-824	Lens
	39.	BPZ20P040FMC	Screw
	40.		Holder
	41.	YE30FUC	Washer
	42.	CBH-793	Spring
	43.		Lever
	44.		Holder
	45.	CXD-519	Bearing Unit
	46.	CNL-921	P.C. Board
	47.	BPZ20P080FMC	Screw
	48.	CNY-142	Spacer
★	49.	CAC-577	Button (EJECT)
★	50.	CAC-609	Button (Tape)
★	51.	CAC-615	Button (Clear)
★	52.	CAC-608	Button (Tuner)
	53.	CNN-169	Cushion
	54.	CXD-437	Grille Assy (/US, CA)
		CXD-438	Grille Assy (/CS)
	55.	PTZ20P080FNi	Screw
	56.	CNW-818	Holder
	57.	CAT-220	Door
	58.	CBH-888	Spring
	59.		P.C. Board
	60.	CNL-819	P.C. Board
★★	61.	CEL-165	Lamp
	62.	HBF-120	Washer
	63.	BMZ20P030FBK	Screw
★	64.	CAC-970	Knob
	65.	CWX-577	Audio Control Unit (2/2)
	66.	CKS-212	Plug
★★	67.	CEL-162	Lamp
	68.	VACANT	
★★	69.	CCS-397	Volume (BALANCE)
★★	70.	CCS-332	Volume (BASS, TREBLE)
	71.	CKS-208	Plug
	72.		Frame
	73.	CNM-930	Cover

13. TUNER EXPLODED VIEW (TUNER SECTION)

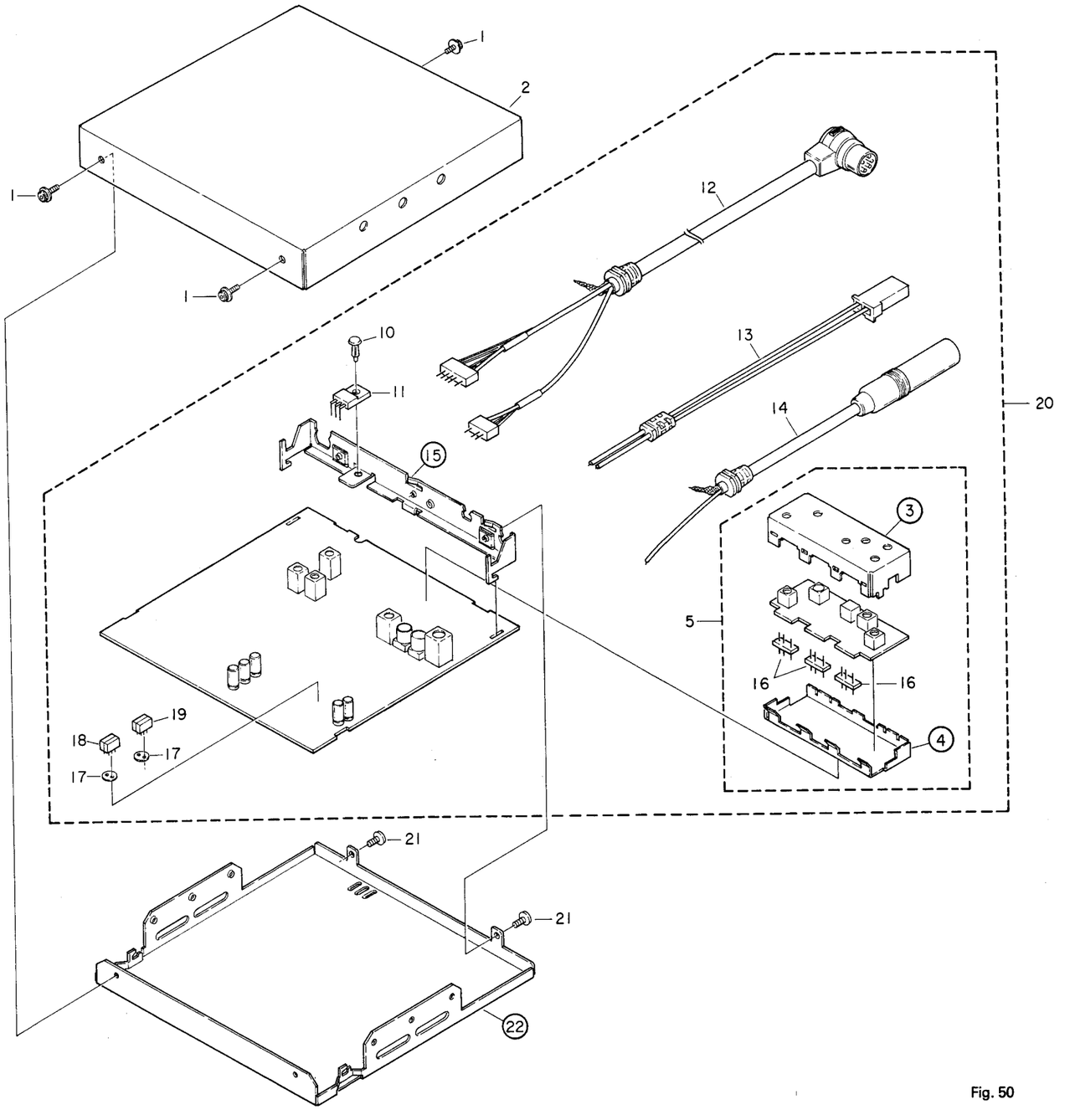


Fig. 50

• **Parts List**

Mark	No.	Part No.	Description
	1.	BMZ26P040FZK	Screw (FEX-55/US, CA)
		CBA-142	Screw (FEX-55/CS)
	2.	CNB-839	Case (FEX-55/US, CA)
		CNB-847	Case (FEX-55/US, CA)
	3.		Case
	4.		Case
	5.	CWB-152	FM Front End
	6-9.	VACANT	
	10.	CBM-024	Rivet
★★	11.	2SB941	Transistor
	12.	CDK-089	Connector
	13.	CDF-360	Cord
	14.	CDH-061	Antenna Cable
	15.		Holder
	16.	CKS-601	Plug
	17.	CNV-724	Bush
	18.	CTF-205	Filter
	19.	CTF-206	Filter
	20.	CWE-612	Tuner Unit
	21.	BMZ26P040FMC	Screw
	22.		Chassis

14. ELECTRICAL PARTS LIST

NOTE:

When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω	*56 × 10¹*	*561*	*RD1/4PS 5 6 1 J*
47kΩ	*47 × 10³*	*473*	*RD1/4PS 4 7 3 J*
0.5Ω	*0R5*		*RN2H 0 R 5 K*
1Ω	*010*		*RS1P 0 1 0 K*

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ 562 × 10¹ ..... RN1/4SR 5 6 2 1 F

- *For your Parts Stock Control, the fast moving items are indicated with the marks ★ ★ and ★.*
  ★ ★: GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts whose parts numbers are omitted are subject to being not supplied.*

Audio Control Unit (CWX-577)
Consists of • Main Unit • Volume Unit • Acc Sense Unit

Audio Control Unit (CWX-577)

MISCELLANEOUS

Mark	Symbol & Description	Part No.
★★	IC1	MB3106M
★★	IC2	HA12047
★★	IC3	TC9154P
★★	IC4	TA75558P
★★	IC5	PA3019
★★	IC6	PD4056A
★★	IC7	PD4055A
★★	Q1, Q2, Q19 – Q24, Q26, Q27, Q30, Q33 – Q36	2SC1740S or 2SC2458
★★	Q5 – Q8, Q11, Q12, Q25, Q404	2SA933S or 2SA608SP
★★	Q9, Q10	2SC3113
★★	Q13, Q14	2SA838 or 2SA1005
★★	Q28	2SC2060
★★	Q29	2SA934
★★	Q31	2SD1055F
★	Q32, Q407, Q408	2SC1740S
★	D1 – D4, D8, D10 – D12, D20 – D30, D32, D35, D37, D38, D40, D42	1SS133 or 1SS176
★	D9	1SS133
★	D13, D33	MTZ6R8JA or MTZ6R2JC
★	D14, D34	ERA15-02
★	D16 – D18, D31	MTZ4R7
★	D19, D39	MTZ5R6JBC
★	D36	MTZ8R2JC or HZS8R2JB2
★	D43	MTZ6R2B

Mark	Symbol & Description		Part No.
	L1	Transformer	CTX-073
	L2	Ferri Inductor	CTF-156
	IB1		CWW-219
	IB2, IB3		CWW-238
★★	S1, S3	Switch	CSG-212
★★	VR1, VR2	Semi-fixed, 470Ω(B)	CCP-237
★★	VR3, VR4	Volume, 25 kΩ(B)	CCS-332
★★	VR5	Volume, 10 kΩ(AB)	CCS-397
	X2	Crystal	CSS-029
★★	IL2	Lamp	CEL-162
★★	IL3, IL4	Lamp	CEL-165
★★	FU1	Fuse	CEK-058

RESISTORS

Mark	Symbol & Description	Part No.
	R132, R133, R168, R170, R183, R503, R504	RD1/2PS□□□JL
	R417	RD1/2PS□□□J
	Other Resistors	RD1/4PS□□□JL

CAPACITORS

Mark	Symbol & Description	Part No.
	C1, C2	CKPYB391K50L
	C3, C4, C25, C26	CEANL4R7M35LL
	C5, C6, C107, C108	CEA220M16L2
	C9, C10	CQMA223J50L
	C11, C12, C17, C124, C125	CEA221M10L2
	C13 – C16, C19, C20, C41, C42	CEAR47M50NPLL
	C18, C21, C22, C40, C123	CEA101M10L2
	C23, C24, C43, C44, C133, C134	CEA100M16L2
	C27, C28	CQMA472J50L
	C29, C30, C128	CEA010M50L2
	C31, C32	CQMA183J50L
	C33, C34	CEAR22M50L2
	C35, C36	CEAR68M50LL
	C37, C38	CQMA333J50L
	C39, C70	CEA470M16L2
	C51, C52	CKPYX682M16L
	C53, C54, C101 – C106	CQMA473J50L
	C55, C56, C109	CCPSL330J50L
	C57, C69	CEA470M16LS
	C58	CEA101M10LL
	C59 – C62, C65, C66	CEA100M25LS
	C63, C64	CKPYB102K50L
	C67	CKPYB471K50L
	C110	CEAR68M50LL
	C111	CEAR15M50LS2
	C112	CQMA392J50LL
	C113	CEA4R7M35LS
	C114, C115, C120, C158	CQEA473J50
	C116, C117	CEA101M35L2
	C118, C126 470μF/16V	CCH-114
	C119, C121, C122	CCDCH330J50L
	C129	CEAR22M50LS
	C135	CQMA473J50L
	C136	CEA100M16L2
	C137	CEA4R7M25L2
	C150 – C155, C305 – C307	CKPYX222M16L
	C501	CCDCH220J50

Tuner P. C. Board

MISCELLANEOUS

Mark	Symbol & Description		Part No.
★★	IC1		PA0013
★★	IC2		PA0014
★★	IC3		PA0015
★★	IC5		PA2014
★★	IC6		PA3016
★★	IC7		PA0007
★★	IC8		μPB554C
★★	IC9		μPD2819C
★★	IC10		PD4021 or PD4021A
★★	Q1, Q4, Q5, Q8	Chip Transistor	2SC2712-LG or 2SC2712-LL or 2SC2712-LY or 2SD601-YR or 2SD601-YS
★★	Q2, Q3	Chip Transistor	2SB709-AR or 2SB709-AS
★★	Q9, Q10, Q12 – Q18, Q20, Q21, Q24, Q25, Q31		2SC2634NC
★★	Q11		2SK49-H2
★★	Q19		2SC1645
★★	Q22		2SD468
★★	Q23		2SB941
★★	Q26, Q30		2SC3113
★★	Q27		2SB772
★★	Q28, Q29		2SB562
★★	Q32		2SA608NP
★★	Q38, Q39		2SD1012-G
★	D2		SM-1A-02LFD
★	D5, D6, D9, D11, D12, D13, D19, D23, D24		US1040 or 1S1555
★	D7, D8, D14, D20, D21, D30, D32		US1040
★	D10, D31		HZ5B
★	D15 – D18, D25 – D29, D33, D34, D36, D38		1S2473VH
★	D22		KV1235Z3
★	D35		RD8R2EB1
★	D37		MV-104V
	L1, L4	Ferri-Inductor	CTF-156
	L2	Ferri-Inductor	CTF-155
	L3	Coil	CTC-144
	L5	Coil	CTB-154
	L6	Coil	CTB-156
	L7	Coil	CTB-159
	T1	Coil	CTC-193
	T2	Coil	CTC-194
	T6	Coil	CTB-155
	T7	Coil	CTB-157
	T8	Coil	CTB-158
	T9	Filter	CTF-178

Mark	Symbol & Description		Part No.
	T10	Coil	CTE-142
	T11	Coil	CTE-143
	T12	Filter	CTF-211
	TC3, TC4	Trimmer	CCG-070
	CF1	Ceramic Filter	CTF-101
	CF3	Filter	CTF-183
	CF4	Filter	CTF-212
	CF5	Ceramic Resonator	CTF-133
	CF6	Filter	CTF-205
	CF7	Filter	CTF-206
	CF8	Filter	CTF-173
	CF9	Filter	CTF-100
	CR1		CWW-183
	CR2		CWW-182
★★	VR1, VR9	Semi-fixed, 22kΩ(B)	CCP-247
★★	VR2	Semi-fixed, 1.5kΩ (B)	CCP-240
★★	VR3	Semi-fixed, 4.7kΩ(B)	CCP-243
★★	VR8	Semi-fixed, 3.3kΩ (B)	CCP-242
	X1	X'tal	CSS-028

RESISTORS

Mark	Symbol & Description	Part No.
	R12, R13, R26, R69, R73, R90, R111, R121, R149, R156	RD1/4PM□□□J
	R75, R78, R85, R98, R101, R102, R115, R124, R136, R161, R176	RD1/4VM□□□J
	Other Resistors (Chip Resistor)	RS1/8S□□□J

CAPACITORS

Mark	Symbol & Description		Part No.
	C1	Chip Capacitor	CCSCH470J50
	C2, C9, C52, C53, C63, C81, C110		CEA010M50L2
	C3, C16, C58, C82, C100, C108, C121, C125, C132		CEA100M16L2
	C4, C5, C7, C8, C69, C72, C86, C93,		CKSYB223K25
	C94, C104	Chip Capacitor	
	C6, C75, C76, C80, C83, C87, C98		CKSYF473Z50
		Chip Capacitor	
	C10, C77, C84, C88, C91, C92, C111,		CKSYB103K50
	C127, C128, C133	Chip Capacitor	
	C11	Chip Capacitor	CCSSL101J50
	C12, C64, C66, C101, C136, C137		CEA4R7M25L2
	C13		CEAR47M50L2
	C14		CEA4R7M16NP
	C15, C109, C138		CEA220M10L2
	C17, C123, C126, C130		CEA470M10L2
	C18, C56, C62		CQMA103K50L
	C19		CQMA822J50L
	C20, C21		CQMA123K50L

Mark	Symbol & Description		Part No.
	C22		CQMA183J50L
	C23		CSZA010M25
	C24		CSZA1R5M25
	C25		CSZA2R2M16
	C26		CQSAH102J50
	C27, C113, C131	Chip Capacitor	CKSYB102K50
	C50, C51		CEA010M50NPLL
	C54, C55, C99		CEA2R2M50L2
	C57		CEA471M16L2
	C59		CEA0R1M50LL
	C60	Chip Capacitor	CKSYB682K50
	C61, C107		CEA2R2M50L2
	C65, C89, C124		CEA101M10L2
	C67, C73, C74, C78, C102		CEA330M10L2
	C68		CQMA104K50L
	C70, C71, C118	Chip Capacitor	CCSCH220J50
	C79	Chip Capacitor	CKSYB272K50
	C85	Chip Capacitor	CCSCH010C50
	C90	Chip Capacitor	CCSRH330J50
	C95	Chip Capacitor	CCSRH271J50
	C96	Chip Capacitor	CCSTH221J50
	C97	Chip Capacitor	CCSUJ120J50
	C103	Chip Capacitor	CKSYB183K25
	C105, C120, C122, C129	Chip Capacitor	CKSYB223K25
	C106	Chip Capacitor	CKSYB471K50
	C112	Chip Capacitor	CKSYB332K50
	C114		CSYA0R1M25SAN
	C115		CEAR47M50NP
	C116		CEA2R2M25NP
	C117	Chip Capacitor	CCSCH180J50
	C119	Chip Capacitor	CCSCH330J50
	C135	Chip Capacitor	CCSCH560J50

FM Front End (CWB-152)

MISCELLANEOUS

Mark	Symbol & Description		Part No.
★★	IC1		CWW-173
★★	IC2		PA4009
★★	Q1		P003
★★	Q2		2SC2570 or 2SC2753
★★	Q3		2SK241-GR
★	D1 – D3		KV1310-6
	L1	Coil	CTC-189
	L2	Coil	CTC-190
	L3	Coil	CTC-191
	L4	Chip Inductor	CTF-185
	L5	Chip Inductor	CTF-186
	T1	Transformer	CTC-186
	T2	IF Transformer	CTC-187
	CT1, CT2	Trimmer	CCG-098
	CF1, CF2	Ceramic Filter	CTF-101

RESISTORS

Mark	Symbol & Description	Part No.
	R1, R2, R4 – R11, R14 Chip Resistor	RS1/8S□□□K
	R3, R12, R13	RD1/6PS□□□J

CAPACITORS

Mark	Symbol & Description		Part No.
	C1, C2	Chip Capacitor	CCSSH220J50
	C3, C8	Chip Capacitor	CCSCH050C50
	C4, C5, C11, C15, C20	Chip Capacitor	CKSYB222K50
	C6	Chip Capacitor	CCSCH040C50
	C7, C10	Chip Capacitor	CKSYB103K50
	C8	Chip Capacitor	CCSCH050C50
	C9	Chip Capacitor	CCSSH560J50
	C12, C18	Chip Capacitor	CCSTH150J50
	C13	Chip Capacitor	CCSTH330J50
	C14	Chip Capacitor	CCSTH120J50
	C16, C19, C21	Chip Capacitor	CKSYF223Z50
	C17	Chip Capacitor	CCSUJ080D50
	C22		CEA2R2M35LS
	C23		CEA3R3M25LS

S Unit

Mark	Symbol & Description	Part No.
★★	Q601	2SC2458
★	D601	MTZ6R2JB
	R601 – R603	RD1/4PS□□□JL
	C601	CQMA103J50L

Switch Unit (A)

Mark	Symbol & Description		Part No.
★	D1 – D3	LED	BG5724K
★★	S4 – S11	Switch	CSG-212

Switch Unit (B)

Mark	Symbol & Description		Part No.
★★	S18 – S21	Switch	CSG-212
★	D1 – D3	LED	BG5724K

Display Unit (CWS-222) (FEX-55/US, CA)
Display Unit (CWS-223) (FEX-55/CS)

Mark	Symbol & Description		Part No.
★★	IC8		PD7005
★	D401	LED	AA5724K
★	D402 – D407	LED	BG5724K
★★	S12 – S17	Switch	CSG-212
★	FL Tube		CP5209CGLR
	R401 – R416, R418 – R421	Chip Resistor	RS1/8S□□□J
	C401	Chip Capacitor	CCSCH101J50

Switch P.C. Board

Mark	Symbol & Description		Part No.
★★	S1	Switch (CST SET)	CSN-089
★★	S2, S3	Switch (CST IN, 70 μs)	CSN-091
★	MR1, MR2	Magnetic Resistive device	SDME106A

P.C. Board Unit

Mark	Symbol & Description	Part No.
★	D1 – D3	1S1555

Miscellaneous Parts List

Mark	Symbol & Description		Part No.
★★	Head Unit		CXD-758
★★	S18	Switch (Door)	CSN-092
★★	M1	Motor (Head)	CXM-452
★★	M2	Motor (Gear)	CXM-351
★★	M3	Motor (Capstan)	CXM-161

15. PACKING METHOD

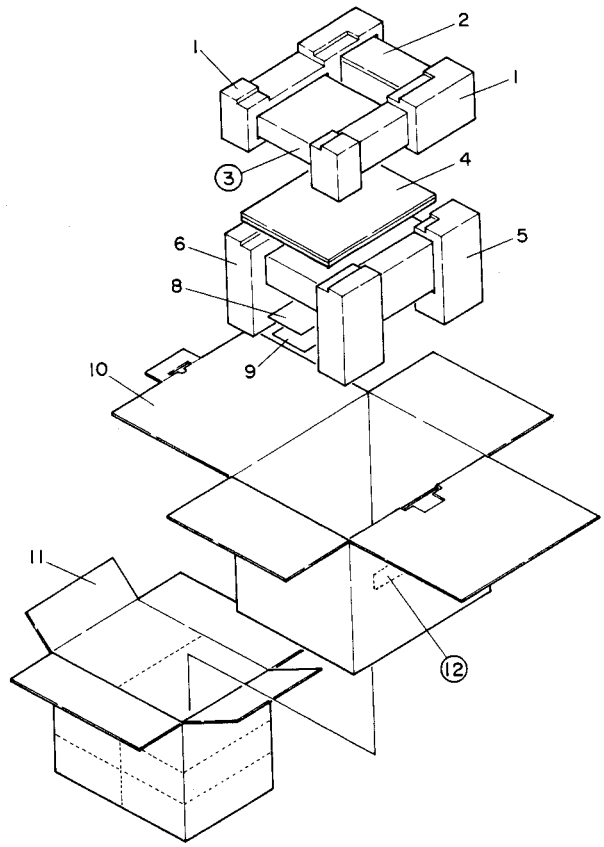


Fig. 51

• Parts List

Mark	No.	Part No.	Description
	1.	CHD-435	Styrofoam
	2.	CNG-223	Holder
	3.		Tuner Assy
	4.	CRB-512	Owner's Manual (FEX-55/US, CA) (English)
		CRB-513	Owner's Manual (FEX-55/CA) (French)
		CRD-534	Owner's Manual (FEX-55/CS) (English, Spanish)
		CRG-011	FM Guide (FEX-55/US)
			Card (FEX-55/US, CA)
	5.	CHD-935	Styrofoam
	6.	CHD-936	Styrofoam
	7.	VACANT	
	8.	CNB-793	Panel
		CNW-757	Holder
	9.	CEA-866	Accessory Kit
	9-1.	CDE-437	Cord
	9-2.	CDF-714	Cord
	9-3.	CDH-048	Antenna Cable
	9-4.	CNF-111	Strap
	9-5.	CNF-382	Lever
	9-6.	CNM-667	Fastener
	9-7.	CNW-642	Holder
	9-8.	CEA-871	Screw Kit
	9-8-1.	CBA-028	Screw for Strap
	9-8-2.	CBA-101	Screw
	9-8-3.	CBA-102	Screw
	9-8-4.	NF40FMC	Nut
	9-8-5.	NF50FMC	Nut
	9-8-6.	WS40FMC	Washer
	10.	CHD-939	Carton (FEX-55/US,CA)
		CHD-940	Carton (FEX-55/CS)
	11.	CHD-941	Contain Box (FEX-55/US)
	12.		Seal (These seals are applied only to the model FEX-55/CA.)

107
XP

PIONEER

Service Manual

ORDER NO.
CRT-468-0

CASSETTE MECHANISM ASSEMBLY

CX-156/A, CX-156/B

- This service manual is for cassette mechanism assembly used in car stereo components.
- Refer to the service manual for individual models for details on sections other than the cassette mechanism assembly.

Model	Service Manual	Cassette Mechanism Assembly
FX-K5/EW	CRT-469	CX-156/A
FX-K5B/EW		CX-156/A
FX-K5SDK/WG		CX-156/A
FEX-55/US, CA, CS	CRT-471	CX-156/A
FEX-50/ES	CRT-470	CX-156/A
KX-E60/EW	CRT-476	CX-156/B

Model	Service Manual	Cassette Mechanism Assembly

CONTENTS

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS (USA) INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.
TEL: (800) 421-1404, (800) 237-0424
PIONEER ELECTRONIC (EUROPE) N.V. Keetberglaan 1, 2740 Beveren, Belgium TEL: 03/775·28·08
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia
TEL: (03) 580-9911

12/14

1. REPLACEMENT OF PARTS IN CASSETTE MECHANISM

• Belt and capstan motor (M3) replacement

1. Remove the four screws and the cover. (Fig. 1)
2. The belt in Fig. 2 can be replaced. (Be sure that the belt is not greased and not twisted.)
3. To replace the capstan motor, remove the two screws shown in Fig. 2.

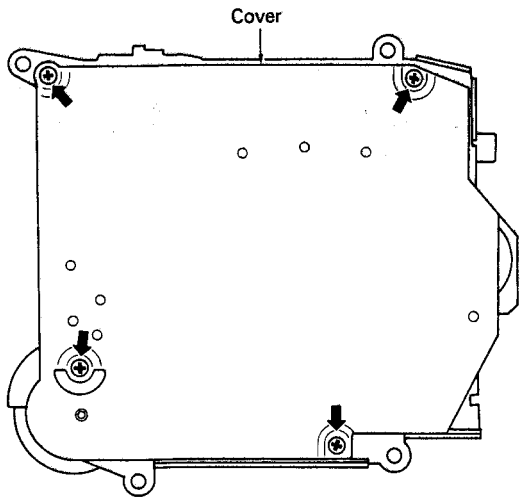


Fig. 1

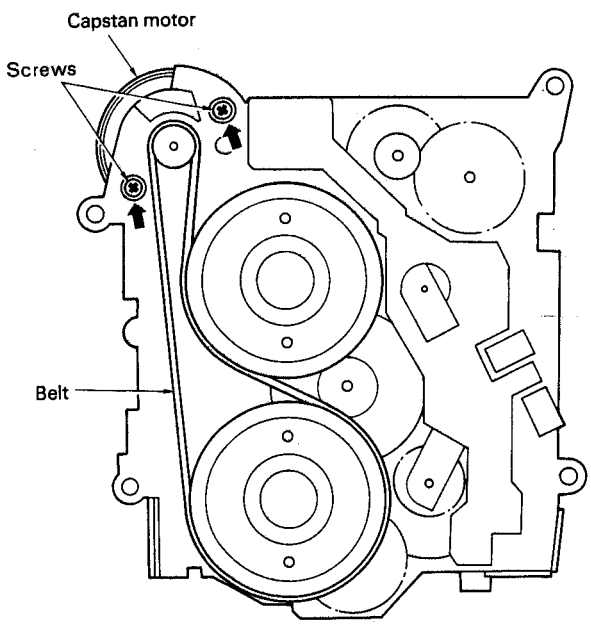


Fig. 2

• Cassette holder removal

1. Turn the capstan motor until the cassette holder drops down. (Do not turn the flywheel directly by hand.)
2. Remove the screw labeled "B", the collar and the spring.
3. Remove unit "A" and the cassette holder "D" and "E".

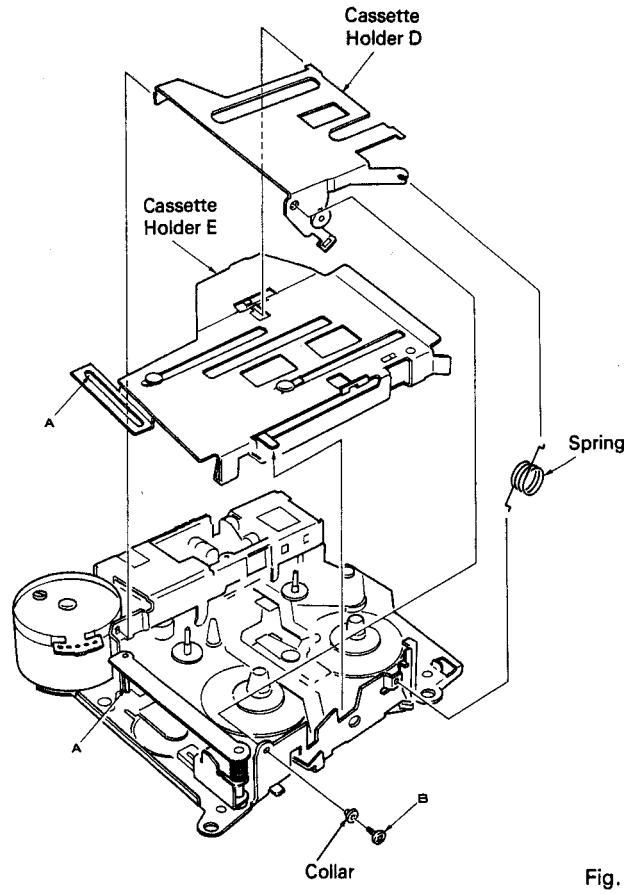


Fig. 3

• Head unit replacement

1. Remove the washer and spring.
2. Remove the screw labeled "F", and the head unit can be removed in the opposite direction.
3. Be careful of the following point during reassembly.
   - Put the head unit pins through the lever holes. (One in front and one in back.)

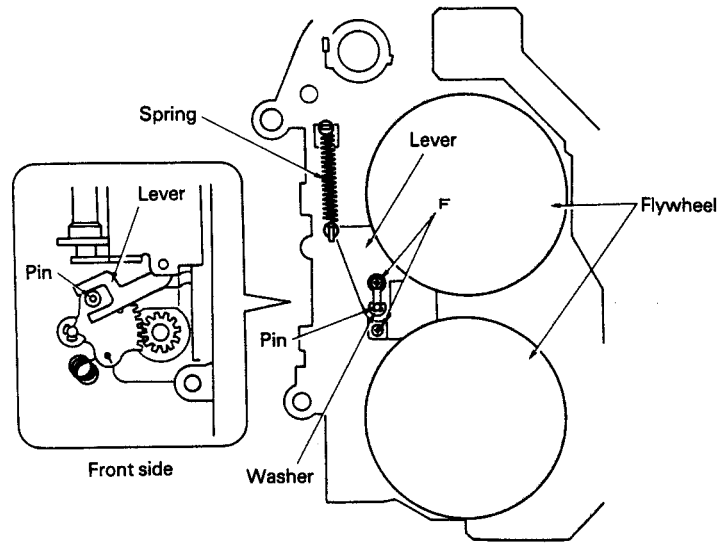


Fig. 4

• Sub-motor replacement (M1 and M2)

1. Remove the two screws labeled "G" and remove the P.C. board unit.
2. The sub-motor can be removed by removing the three screws indicated by the arrows.
3. Sub-motor 2 (for switching the FF/REW gear) can be replaced when the spacer has been removed. (The motor fits very snugly, so some force must be used to remove it.)
4. Sub-motor 1 (for turning and positioning the head) can be replaced by removing the belt, lock washer, pulley and two screws labeled "J".

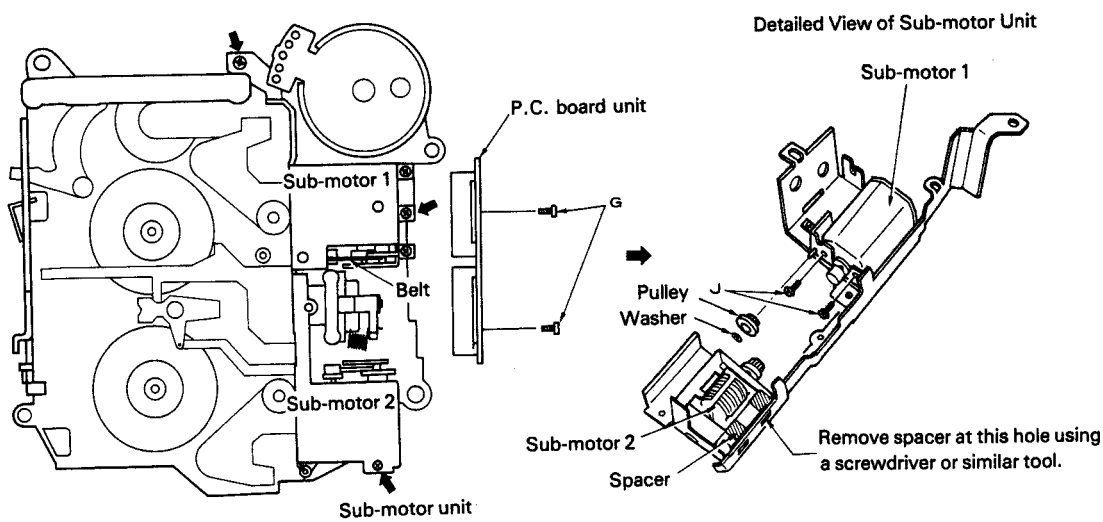


Fig. 5

• Reel unit replacement

1. Remove the six screws and the switch P.C. board.
2. Remove the screw labeled "K" and the collar and free the FF/REW idler gear.
3. The reel assy can be replaced by removing the two screws labeled "L" and removing the reel unit.

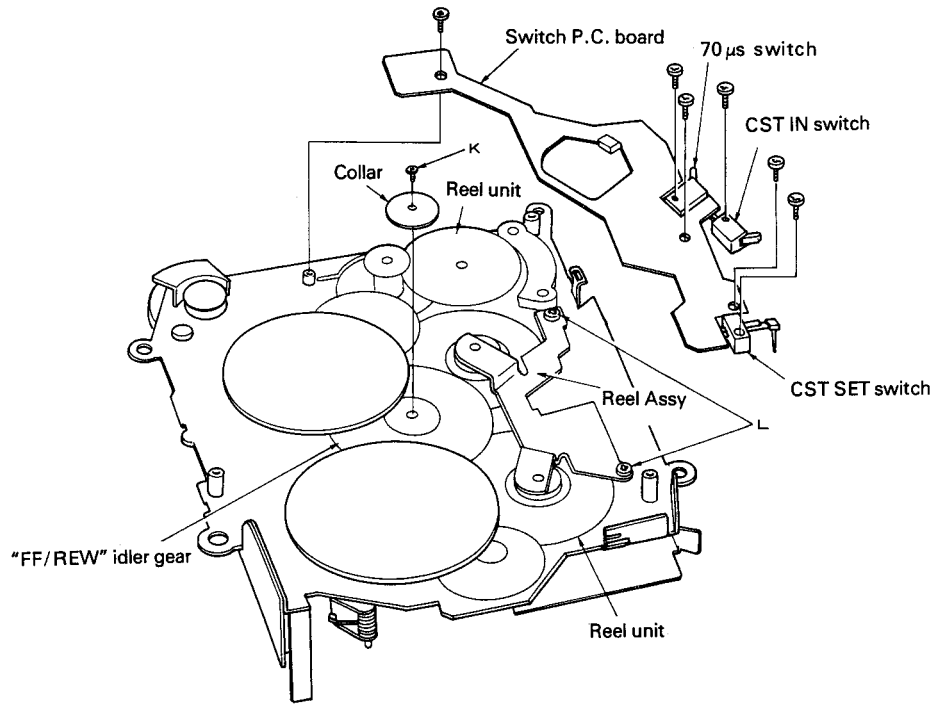


Fig. 6

2. MECHANISM DESCRIPTION

Cassette mechanism assy for CX-156/A is used in this mechanism description.

1. Outline of Mechanism

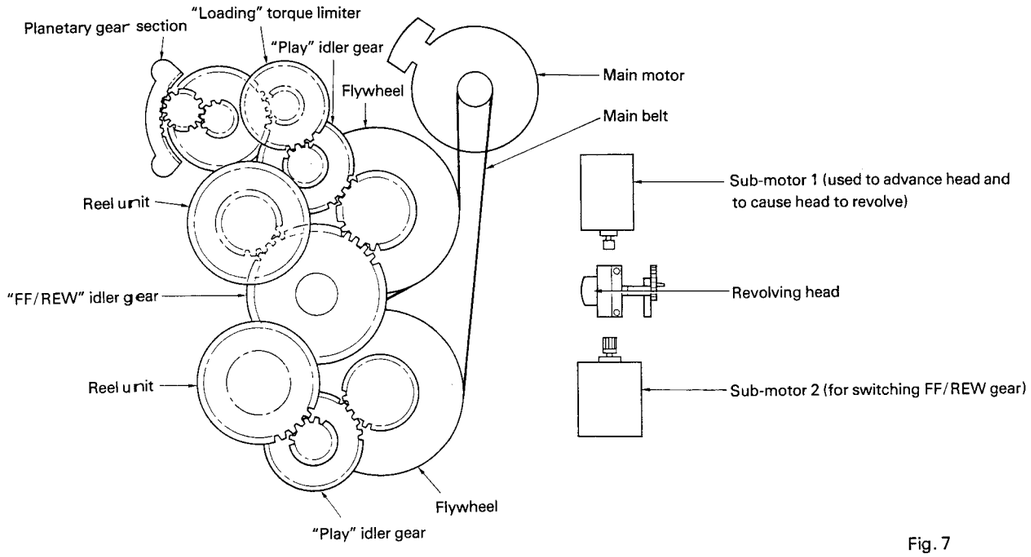


Fig. 7

2. Loading/Eject Function

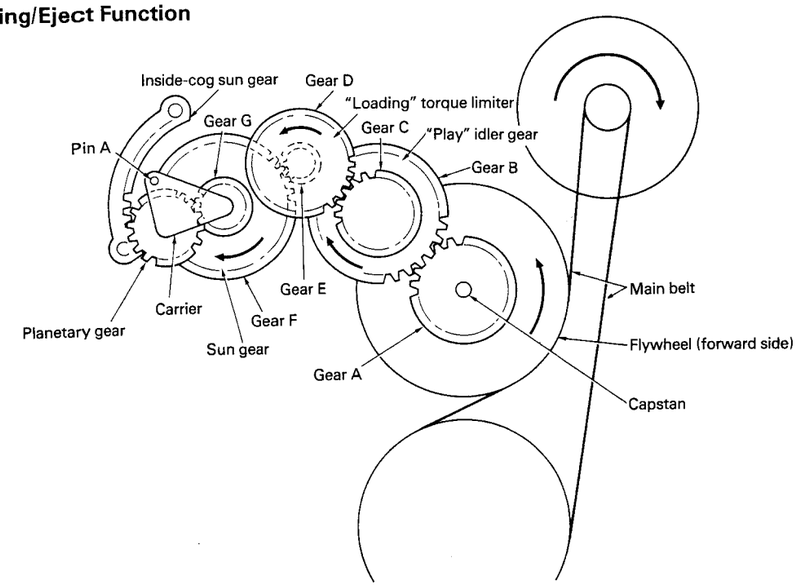


Fig. 8

3. Cassette Tape Load and Eject Mechanism

• Cassette tape loading operation

1. Push the cassette tape lightly in the direction indicated by the arrow. (As shown in Fig. 10, arm "A" and arm "B" connect to spring "A". These are also connected to common axis shaft "A", which is attached to the chassis surface and acts as a swivel. Pin "A", which is caulked to the planetary gear unit carrier, goes through the chassis and fits into the oblong hole of arm "B". Because pin "A" won't move as long as the capstan motor isn't moving, arm "B" won't move either.)
2. When a cassette tape is loaded, arm "A" moves in the direction indicated by the arrow and spring "A" loosens. Lever "A" also moves in the direction indicated by the arrow, and the catch at left of the lever releases arm "C". Arm "C" then turns counterclockwise and opens the CST IN switch. The capstan motor then begins turning forward.
3. The carrier then moves clockwise because the planetary gear moves along the inside-cog sun gear. Pin "A" which is caulked to the carrier also moves in the same direction. (Fig. 11) The movement of pin "A" is causing arm "B" to move counterclockwise. Arm "A" turns in the same fashion and the "A'" unit of lever "A" draws the cassette tape in. (Fig. 9)

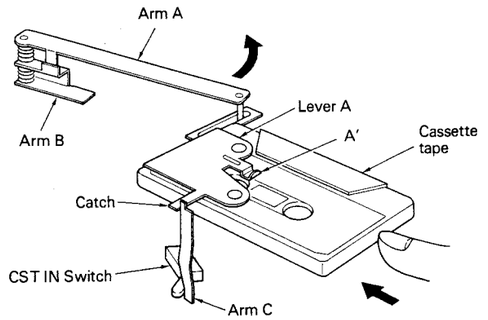


Fig. 9

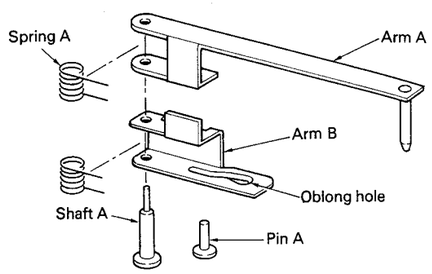


Fig. 10

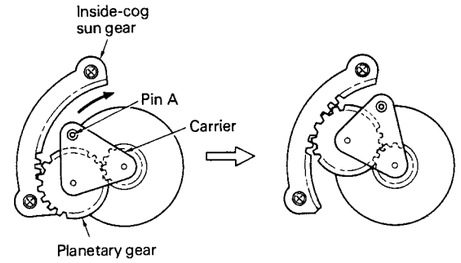


Fig. 11

4. The oblong hole of arm "B" is as shown in Fig. 12. The cassette tape draw-in process will be complete when the pin "A" degree of rotation is θ. Arm "B" will not move while the degree of rotation is θ'.

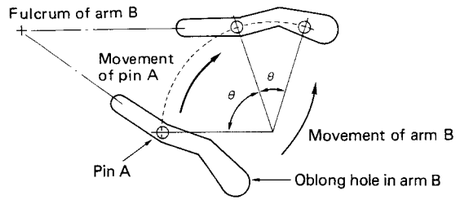


Fig. 12

5. As shown in Fig. 13, arm "C" (caulked to the chassis swivel) is fixed to pin "A" and when the degree of rotation is θ arm "C" is stationary, and when it is θ' arm "C" turns clockwise.

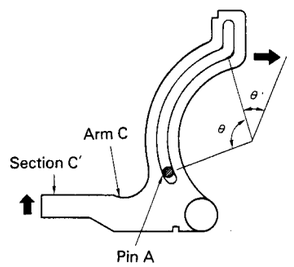


Fig. 13

6. As shown in Fig. 14, the "C'" unit of arm "C" connects to the cassette arm (which suspends the cassette tape) through spring "C". The arm "C" movement described above in paragraph five makes the "C'" unit move in the direction indicated by the arrow in Fig. 14. The cassette arm pushes down holder "A" by means of spring "B". The "C'" unit is released when holder "A" drops down.
7. In order for the capstan motor to keep turning forward, the planetary gear disengages from the inside-cog sun gear and becomes free.

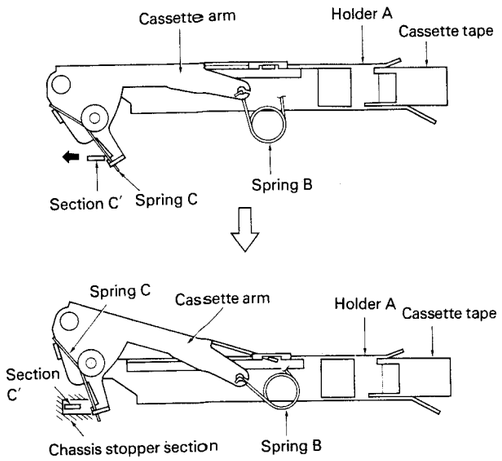


Fig. 14

• Eject operation

1. Turning on the eject switch reverses the capstan motor. As shown in Fig. 15, spring "D" places slight friction on the planetary gear which causes it to engage with the inside-cog sun gear. The cassette tape is ejected following an operation opposite to the loading operation.

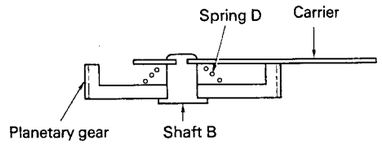


Fig. 15

4. Head Turning and Head Positioning Operations (during forward play)

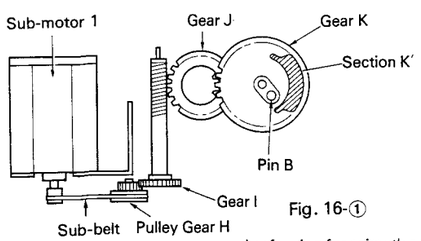


Fig. 16-①

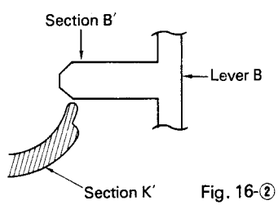


Fig. 16-②

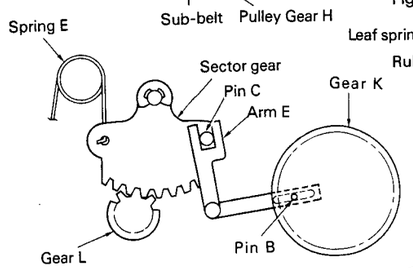


Fig. 16-③

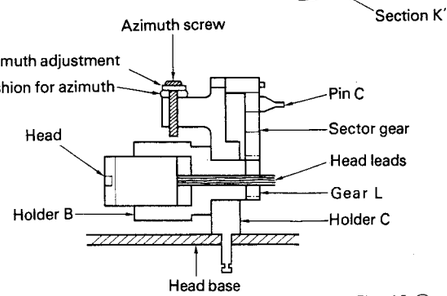


Fig. 16-④

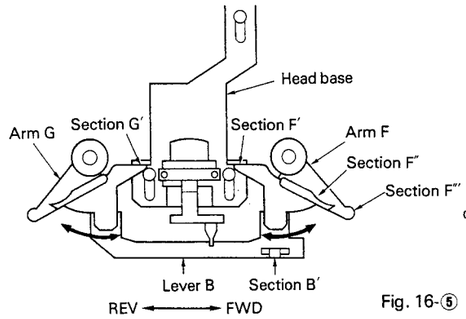


Fig. 16-⑤

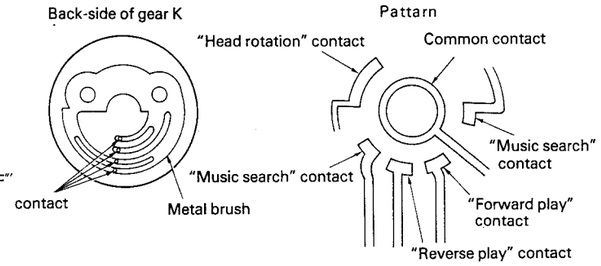
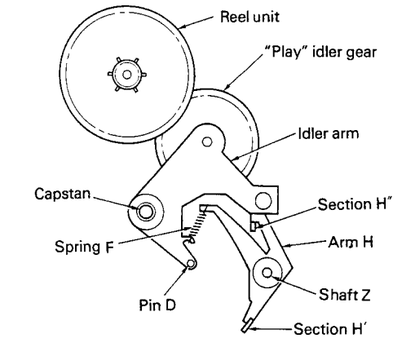


Fig. 16-⑥



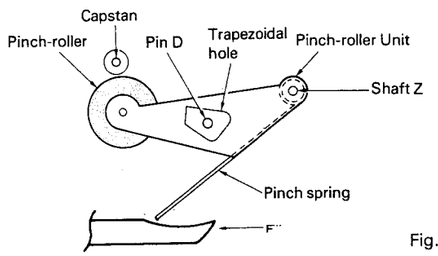


Fig. 17

1. The sub-belt from sub-motor 1 goes through pulley gear "H", gear "I", gear "J" and turns gear "K". Head turning and head base positioning take place using the "K'" unit (the projecting unit) of gear "K" and pin "B". There is a metal brush attached to the back of gear "K" which detects the passing through of all patterns and common patterns and stops sub-motor 1. This controls the head positioning, the head turning, the contact pressure of the play idler gear and the contact pressure of the pinch roller.
2. Head turning at pin "B" takes place until gear "K" starts turning which brings the "K'" part into contact with the lever "B", "B'" part. (Fig. 16-③)
3. Pin "B" engages with the arm "E" oval opening and rotates arm "E". The arm "E" sector gear is engaged with pin "C" and this turns the head. The head rotation pattern (Fig. 16-⑥) performs this operation inside a certain angle.
4. When gear "K" turns it also pushes the lever "B", "B'" part. The "B'" part turns arm "F" and arm "G" counterclockwise and advances head base with the arm "G", "G'" part. (Fig. 16-②, ⑤)
5. After the head base goes beyond the MS pattern (Fig. 16-⑥) position, the arm "F", "F'" part pushes the pinch roller unit pinch spring and presses the pinch roller down onto the capstan. (Fig. 17)
6. Simultaneously, the arm "F", "F" unit pushes the arm "H", "H" part. The "H"" part lock releases when pushed, and the play idler gear comes into contact with the reel unit. Play operation begins because of this. (Fig. 16-⑤, Fig. 17)
7. When going from play to eject, first, the pinch roller disengages from the capstan, and then using the pinch roller unit trapezoidal hole, releases the idler arm from the reel unit by means of pin "D". After that, the "H"" unit again meshes with the idler arm and the "play" idler gear stops after completely disengaging from the reel unit.

5. FF/REW Operation

1. As with the head operations a brush is attached to the back of gear "P" and using patterns and the brush, position sensing takes place and this controls the FF/REW operation.
2. Sub-motor 2 goes through gears "L", "M" and "N" and turns gear "P". When gear "P" turns, arm "I" rotates by means of arm "J". Arm "I" rotates the FF/REW idler gear and engages it with the reel unit.

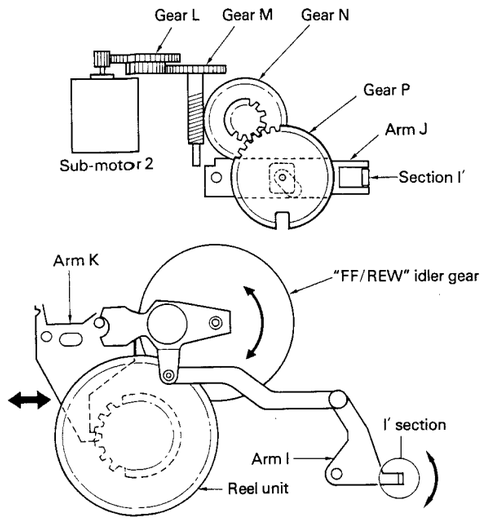


Fig. 18

3. ADJUSTMENT

3.1 AZIMUTH ADJUSTMENT

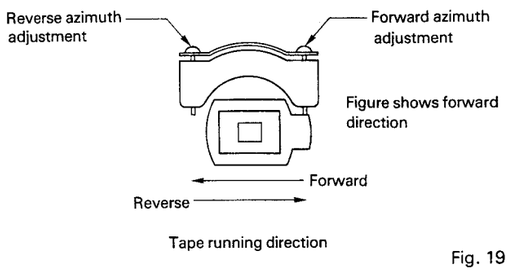


Fig. 19

• To Adjust

1. Play "A" side of STD-341A (10kHz, −20dB). Adjust each screw for maximum output in forward and reverse directions.
2. Play "B" side in forward and reverse directions to confirm adjustment.

3.2 TAPE SPEED ADJUSTMENT

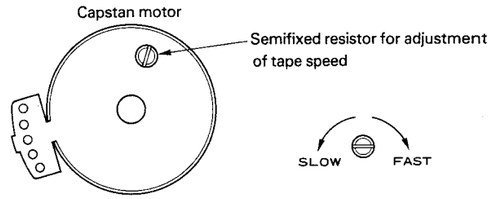
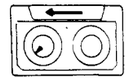
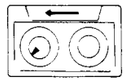
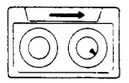
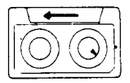


Fig. 20

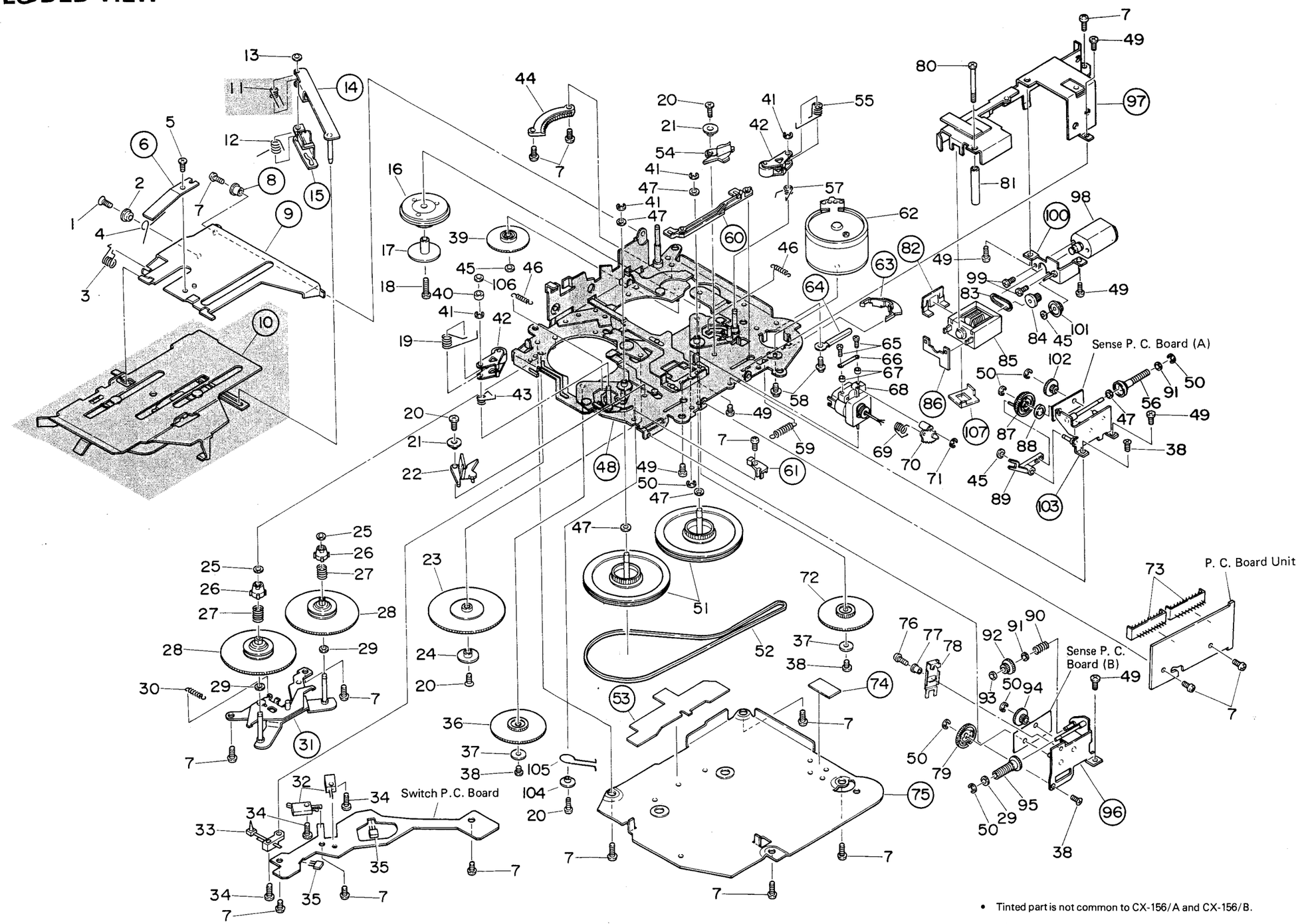
• To Adjust

1. Reproduce STD-301 (3kHz, −10dB). Adjust the semifixed resistor so that the frequency counter shows 3,010Hz (+30Hz, −30Hz).

3.3 CHECK POINTS OF CASSETTE MECHANISM

Confirm the following items when replacing parts of the cassette mechanism.	■ Tape speed deviation: 3,000 $^{+90}_{-30}$ Hz (4.76 cm/s $^{+3}_{-1}$ %) Using an STD-301, measure the speed at the start and end of winding and see that a deviation remains within the limits each time. If values indicated by the pointer vary considerably, adjust to 70% of the minimum and maximum values. Measuring time shall be 5∼6 seconds.	■ Wow and flutter: Less than 0.15% (WMS) Using an STD-301, measure the wow and flutter at the start and end of winding and take the maximum value. If values indicated by the pointer vary considerably, adjust to 70% of the minimum and maximum values. Measuring time shall be 5∼6 seconds.
■ Fast forward and rewinding time: 95∼115 seconds Using a C-60, set to fast forward and rewind, and measure the time with a stop watch.	■ Winding torque: 40∼60g • cm  Using a cassette type torque meter (100 g·cm), measure the minimum value while in the play mode. Measuring time shall be 5∼6 seconds.	■ F.F. torque: 70∼110g • cm  Using a cassette type torque meter (120 g·cm), measure the value when the tape stops in the F.F. mode.
■ REW torque: 70∼110g • cm  Using a cassette type torque meter (120 g·cm), measure the value when the tape stops in the REW mode.	■ Back tension torque: 2.0∼3.5g • cm  After setting in the REW mode without loading a cassette tape for 5 minutes, measure the back tension torque in the play mode, using a cassette type torque meter.	■ Cassette loading force: 450∼550 g Push the center of the cassette and measure the force with a tension meter (1 kg).

4. EXPLODED VIEW



• Tinted part is not common to CX-156/A and CX-156/B.

Fig. 21

NOTE:

- *For your Parts Stock Control, the fast moving items are indicated with the marks ★ ★ and ★.*
  ★ ★: GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts whose parts numbers are omitted are subject to being not supplied.*

Mark	No.	Part No.	Description
	1.	HBA-193	Screw M1.4×3.5
	2.	CLB-691	Collar
	3.	CBH-837	Spring
	4.	CBH-867	Spring
	5.	HBA-147	Screw M1.4×1.4
	6.		Spring
	7.	BMZ20P040FMC	Screw
	8.		Bush
	9.		Arm
	10.		Holder Unit (CX-156/A)
			Holder Unit (CX-156/B)
	11.	CBH-836	Spring (CX-156/A)
		CBH-887	Spring (CX-156/B)
	12.	CBH-886	Spring
	13.	CBF-046	Washer
	14.		Arm Unit
	15.		Arm
	16.	CXD-388	Gear Unit
	17.	CLB-617	Collar
	18.	CBA-166	Screw M1.7×8
	19.	CBH-832	Spring
	20.	HBA-310	Screw M2×3.5
	21.	CLB-612	Collar
	22.	CNW-930	Arm
	23.	CNW-944	Gear
	24.	CLB-616	Collar
	25.	CBF-135	Washer
	26.	CNW-932	Collar
	27.	CBH-827	Spring
★ ★	28.	CXD-384	Reel Unit
	29.	CBF-088	Washer
	30.	CBH-868	Spring
	31.		Bracket Unit
★ ★	32.	CSN-091	Switch (70μs, CST IN)
★ ★	33.	CSN-089	Switch (CST SET)
	34.	CBA-172	Screw M1.7×5.5
★	35.	SDME106A	Magnetic Resistive Device
	36.	CNW-943	Gear
	37.	CLB-615	Collar
	38.	HBA-209	Screw M2×2
	39.	CNW-950	Gear
	40.	CLB-690	Roller
	41.	EBG-001	Washer
★ ★	42.	CXD-387	Pinch Roller Unit
	43.	CBH-834	Spring
	44.	CNW-951	Gear
	45.	CBF-126	Washer
	46.	CBH-835	Spring
	47.	HBF-179	Washer
	48.		Chassis Unit (CX-156/A)
			Chassis Unit (CX-156/B)
	49.	HBA-175	Screw M2×2.5
	50.	YE12FUC	Washer
	51.	CNW-942	Flywheel
★ ★	52.	CNT-111	Belt
	53.		Insulator
	54.	CNW-931	Arm
	55.	CBH-831	Spring
	56.	CNW-956	Gear
	57.	CBH-833	Spring
	58.	PMS26P030FMC	Screw
	59.	CBH-830	Spring
	60.		Lever
	61.		Spacer
★ ★	62.	CXM-161	Motor (Capstan)
	63.		Clamper
	64.		Clamper
	65.	CBA-173	Screw M1.4×8
	66.	CBE-114	Spring
	67.	CNY-134	Azimuth Rubber
★ ★	68.	CXD-758	Head Unit
	69.	CBH-829	Spring
	70.	CNW-939	Gear
	71.	YE15FUC	Washer
	72.	CNW-943	Gear
	73.	CKS-534	Plug
	74.		Insulator
	75.		Cover
	76.	HBA-158	Screw M1.4×5
	77.	CLB-750	Collar
	78.	CNH-004	Arm
	79.	CNW-953	Gear
	80.	CBA-165	Screw M2
	81.	CLB-749	Spacer
	82.		Spacer
★ ★	83.	CNT-114	Belt
	84.	CNW-941	Gear
★ ★	85.	CXM-351	Motor (Gear Position)
	86.		P.C. Board
	87.	CNW-952	Gear
	88.	CNN-481	Spacer
	89.	CNW-958	Arm
	90.	CBH-866	Spring
	91.	HBF-116	Washer
	92.	CNW-954	Gear
	93.	CBF-135	Washer
	94.	CNY-077	Gear
	95.	CNY-148	Gear
	96.		Holder Unit
	97.		Guide
★ ★	98.	CXM-452	Motor (Head Position)
	99.	HBA-244	Screw M1.4×1.6
	100.		Bracket Unit
	101.	CNY-075	Pulley
	102.	CNW-955	Gear
	103.		Holder Unit
	104.	CLB-760	Collar
	105.	CBH-893	Spring
	106.	HBF-180	Washer
	107.		Cover

5. CONNECTION DIAGRAM

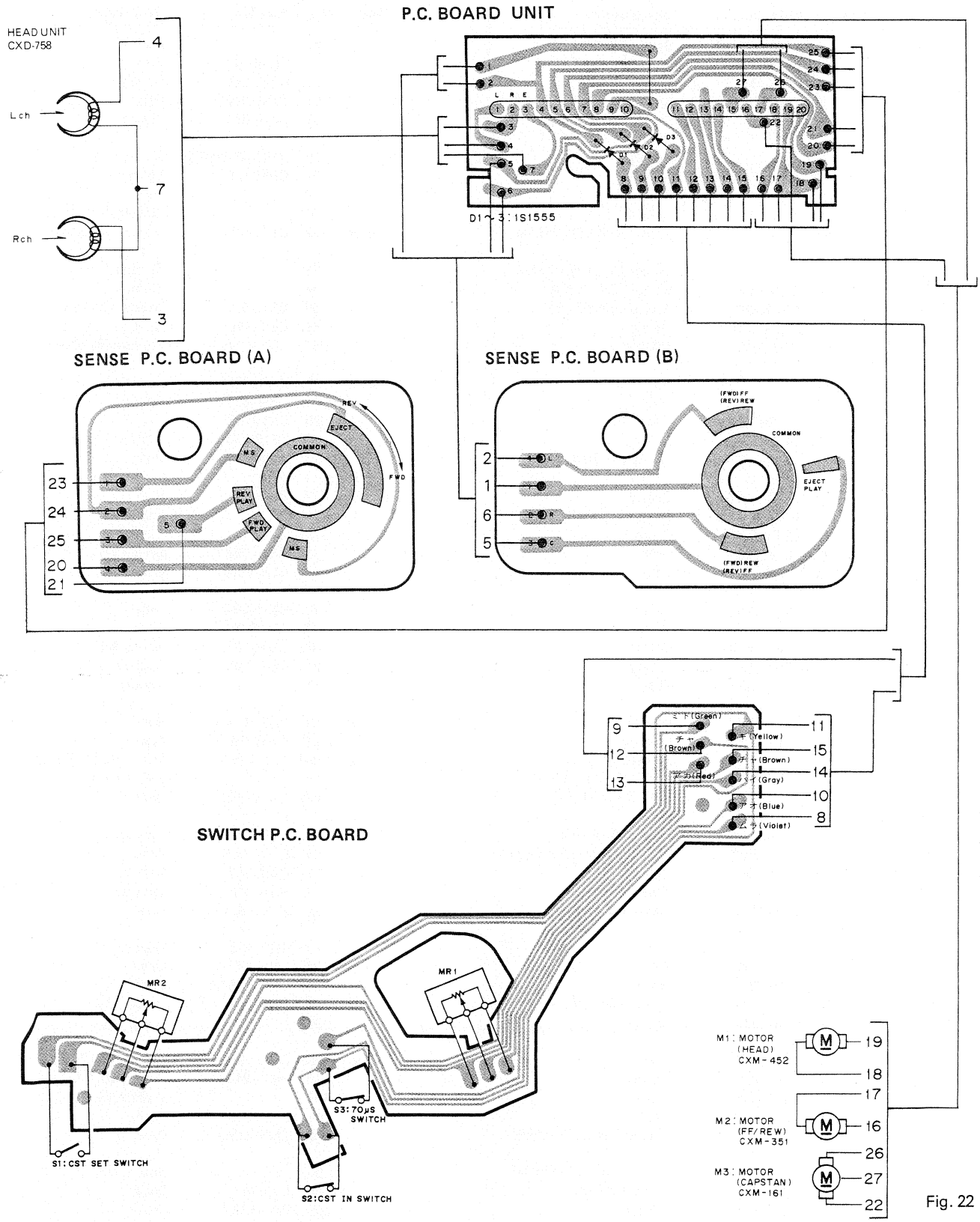


Fig. 22

6. SCHEMATIC CIRCUIT DIAGRAM

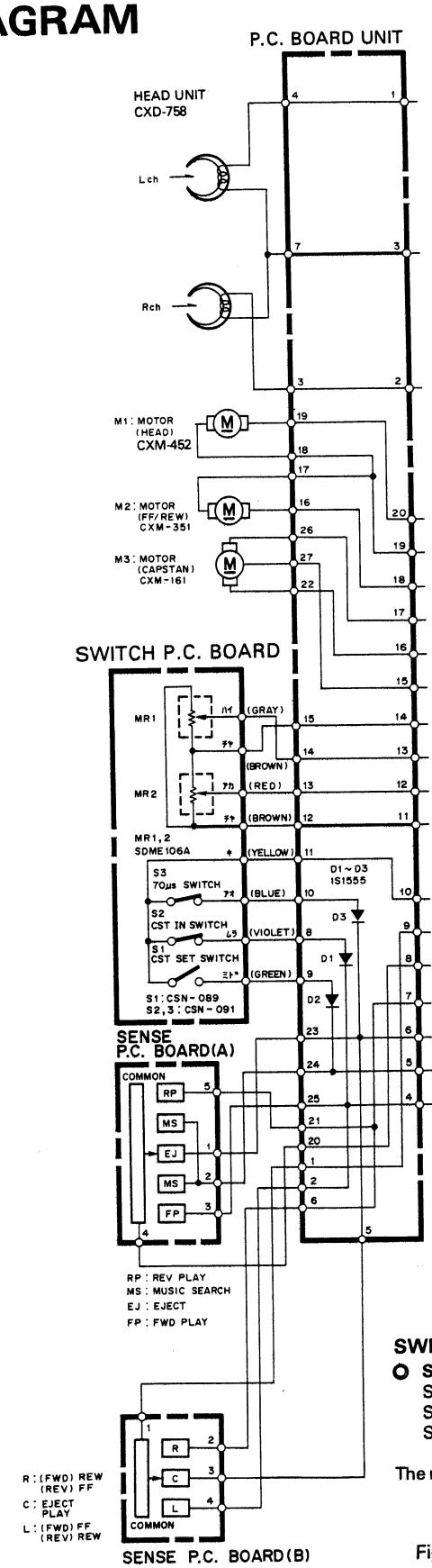


Fig. 23

7. ELECTRICAL PARTS LIST

Switch P.C. Board

Mark	Symbol & Description		Part No.
★★	S1	Switch (CST SET)	CSN-089
★★	S2, S3	Switch (CST IN, 70 μs)	CSN-091
★	MR1, MR2	Magnetic Resistive Device	SDME106A

P.C. Board Unit

Mark	Symbol & Description	Part No.
★	D1 – D3	1S1555

Miscellaneous Parts List

Mark	Symbol & Description		Part No.
★★	Head Unit		CXD-758
★★	M1	Motor (Head)	CXM-452
★★	M2	Motor (Gear)	CXM-351
★★	M3	Motor (Capstan)	CXM-161

SWITCHES

O SWITCH P.C. BOARD

S1: CST SET SWITCH ..... ON – OFF
S2: CST IN SWITCH ..... ON – OFF
S3: 70μs SWITCH ..... ON (120μs) – OFF (70μs)

The underlined indicates the switch position.